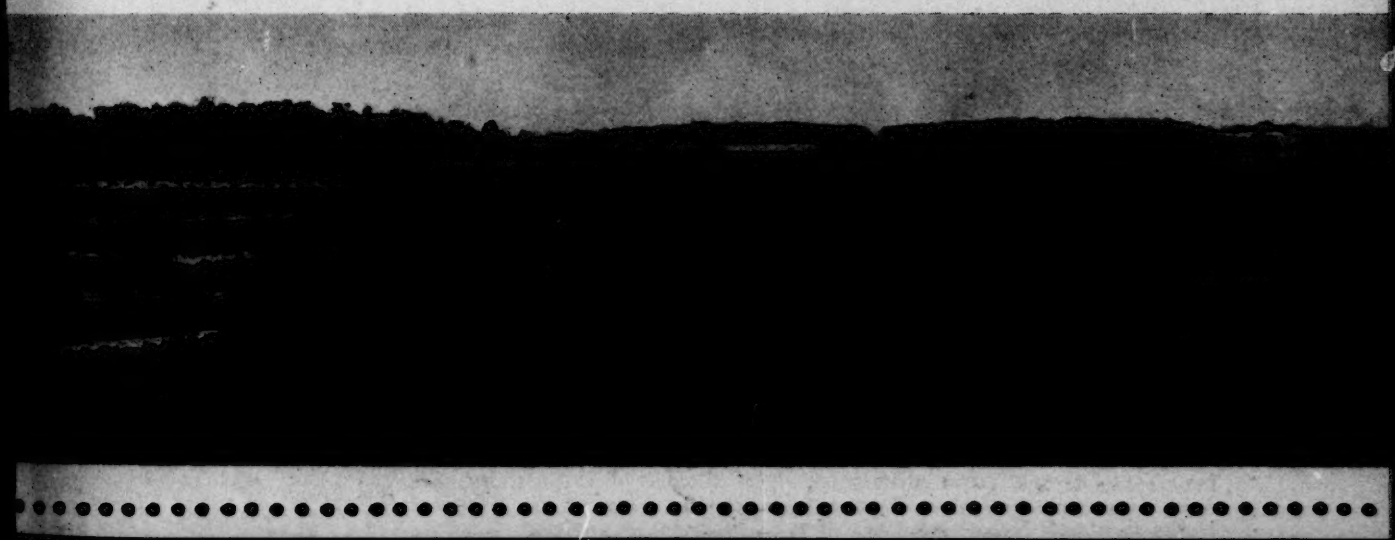
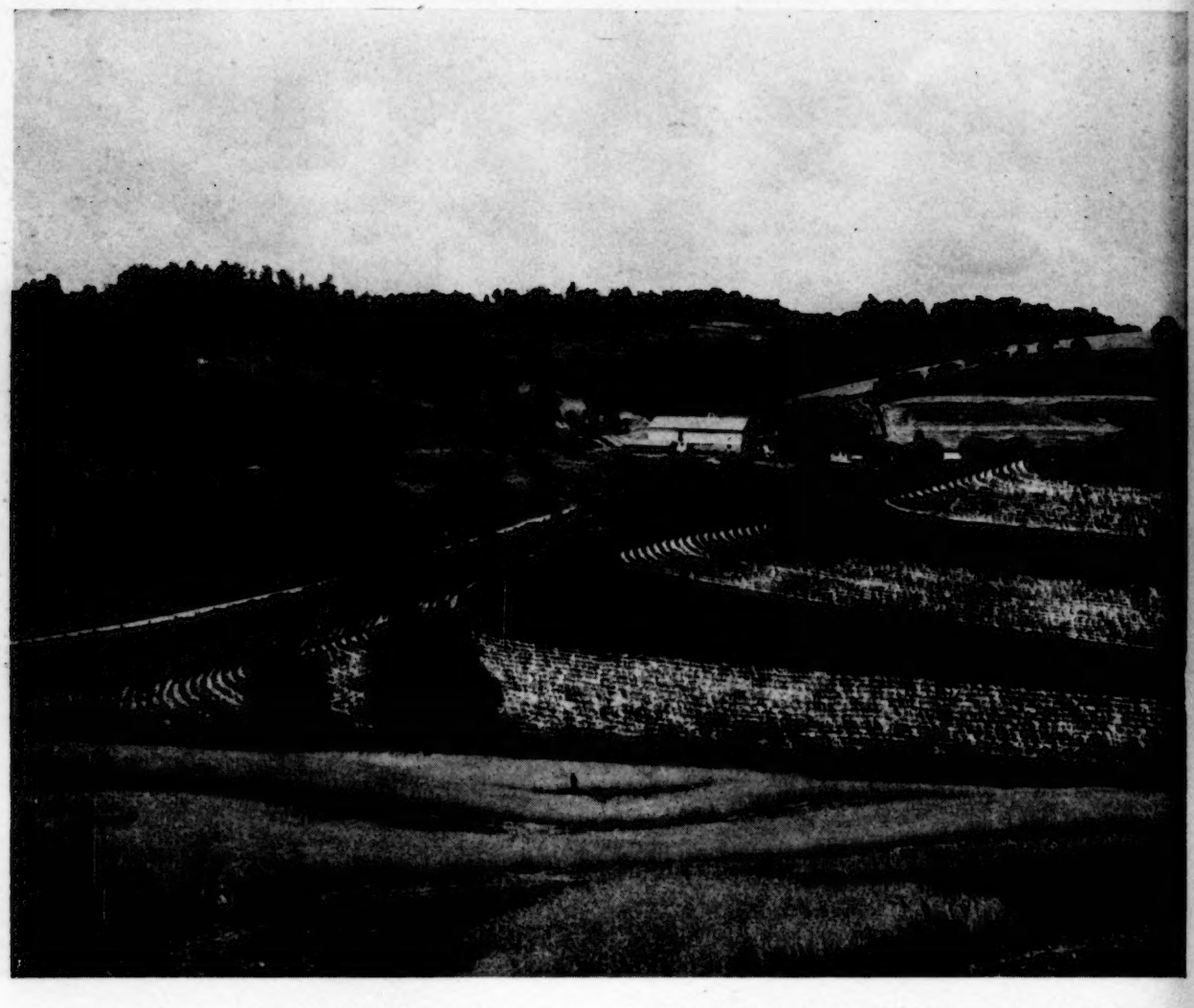
VOLUME 5, No. 3 JULY 1950

CONSERVATION AS A MOVEMENT
LAND USE AND TROUT STREAMS
SOIL CONSERVATION AND THE RULE OF LAW
QUAIL STUDIES ON A RIVER FLOODPLAIN
A METHOD OF COMPUTING CONSERVATION BENEFITS OF A RANGE PROGRAM



Square Pegs in ~~Round~~ square Holes



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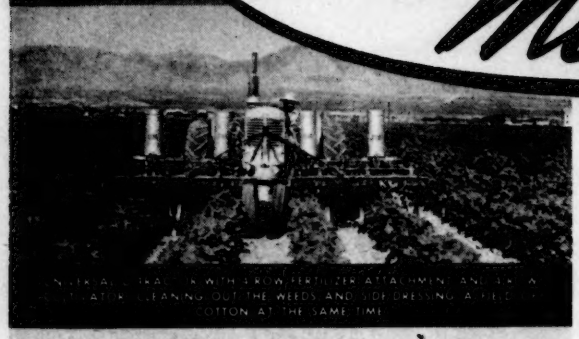

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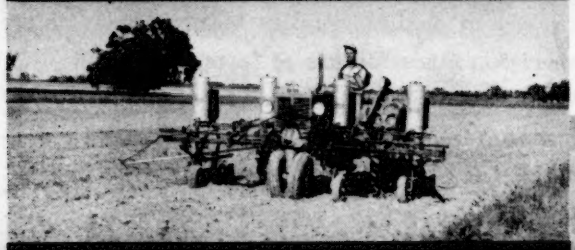

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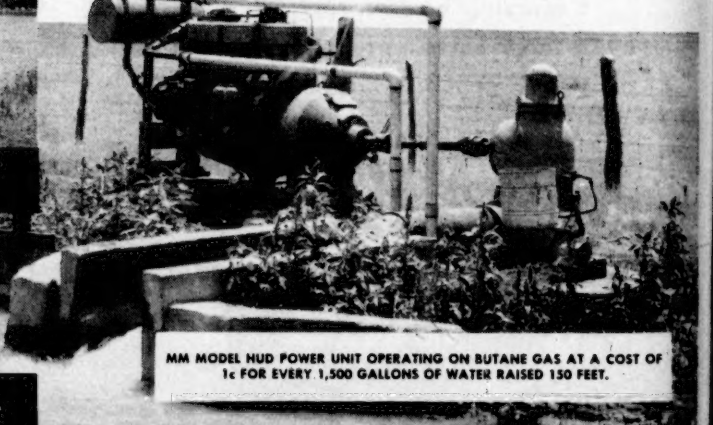

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NUMBER 3

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COVER. This Iowa farmer looks to the land for security. His conservation program will assure him of increased crop yields and a greater net income. The land also stands ready to aid materially in contributing to the needs of our Nation in time of peace or war.

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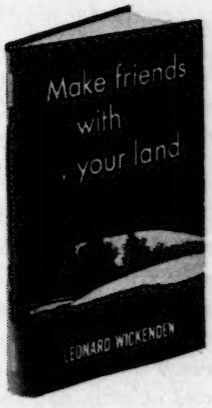

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From the Editor

This issue of the JOURNAL contains twelve and one-quarter pages of advertising. It also marks the beginning of the fifth year of its existence. The JOURNAL started with four pages of advertising and has gradually expanded its field to encompass a wide scope of interest. Advertising is important not only for the revenue produced but the influence that it exerts. F. E. Charles recently pointed out that Deere and Company has distributed approximately 65,000 copies of their advertisement entitled *"An Easy Lesson in Hard Facts."*

The 75th Anniversary celebration of the Connecticut Agricultural Experiment Station, the oldest institution of its kind in America, will be held at New Haven, September 28 and 29. Invitations have been issued to some 3,000 scientists, agriculturists and officials of government, universities, experiment stations, and industry, both in this country and abroad.

Leonard Hall, a dirt farmer, who operates his Possum Trot Farm near Caledonia, Missouri, and a member of the SCSA, received an honorary degree from West-Minister College, Fulton, Missouri, early in June. He was recognized for his outstanding influence and service throughout the Middle West in the promotion of soil conservation and also of great popular interest in things of the out-of-doors and the appreciation of nature. He is the author of "Possum Trot Farm" and a regular contributor to numerous periodicals.

S. T. Dana, Dean of the School of Forestry and Conservation, University of Michigan, reports that the work of his department has been broadened into a School of Natural Resources. The purpose being to centralize responsibility for bringing to students throughout the University information as to the importance of natural resources in local, national, and world affairs, and as to the philosophy and principles underlying their utilization and conservation. Dr. Stanley A. Cain was appointed as Charles Lathrop Pack Professor of Conservation. This appointment was made possible by a grant of $10,000 a year for the next ten years from the Charles Lathrop Pack Forestry Foundation.

"Making Paydirt Last" is the title of a very fine pamphlet published by Allis-Chalmers Tractor Division. It represents another contribution that industry is making to further the conservation movement. The pamphlet is reviewed in the Book Review Section. *"Instructor's Guide to Grassland Farming"* is the title of another excellent four-page insert by J. I. Case Company in the August, 1950 issue of BETTER FARMING METHODS.

"Manuel de conservacion de suelos" is the title of an excellent conservation manual just released by Mexico. It was written by Manuel Alvarez Gastelum, a member of the SCSA. Other conservation publications coming to the editor from south of the Rio Grande include a *"Report on Conservation of Renewable Resources in Latin America"* and *"Conservation in the Americas."* Both pamphlets were compiled, edited and released by the Pan American Union, Washington, D. C.

Devin-Adair Book Company announces the inauguraton of The Farmer's Book Club on page 101. This is a new venture and will be welcomed by farmers and conservation leaders everywhere. The books scheduled for release are by leading authors.

Elsewhere in the JOURNAL reference is made to the annual Soil Conservation Society of America Meeting which is scheduled to be held in Detroit, October 26-28. Reports coming from the committee on arrangements indicate that a very outstanding program has been planned. Speakers on the general and technical programs include leaders representing industry, business, agriculture, and education—all interested in the extent and condition of our natural resources. Many local chapters are already making plans to send delegations to the meeting, under the banner *"On to Detroit."*

The Public Affairs Committee, 22 East 38th Street, New York 16, recently published a new thirty-two page pamphlet entitled "This Land of Ours." It is a pictorial presentation of man's dependence on resources and what must be done to properly use and maintain them for future needs. Copies may be obtained for 30c each. Another excellent publication entitled "The Changing Forest Situation" by Frank Sweeney was recently released by American Enterprise Association, Inc., 4 East 41st Street, New York 17. Copies are available upon request for 50c each.

"Water Laws in the United States" by Milo B. Williams is the title of a new publication just issued by the Food and Agriculture Organization. It is a selected reference list of publications with some reproductions, basic excerpts, and lists of contents relating to water rights, irrigation, conservation, drainage, and floods.

Conservation as a Movement

CARL C. TAYLOR

The soil conservation movement, says Dr. Taylor, has already moved far beyond the technical job of building terraces, check dams and laying out contour strips. It is calling for a national land policy and some of its adherents are calling for a national population policy. There are other evidences that the conservation movement in the United States is becoming a people's movement. This is tremendously significant for all real movements are people's movements. Until they become such they do not get anywhere.

IMPORTANT ECONOMIC AND SOCIAL adjustment in a democratic society are accomplished by what sociologists call *Movements*. In non-democratic societies they are accomplished by revolts and revolutions, or not accomplished at all. The Abolition Movement was the first great one in our history. It did not succeed in accomplishing the adjustment it sought and we had to fight a civil war to settle the issues involved. Our public education movement, women's suffrage movement, labor movement and a number of others have succeeded.

We have had a general farmers' movement from the beginning of our history. It is still going and going strong because it is the continuous attempt on the part of farmers, who had for a long while practiced self-sufficient agriculture, to adjust themselves successfully to a price and market economy. This movement will continue on its historical way until the problems it attacks are solved by typically democratic processes. We also have the cooperative movement and the conservation movement.

People Must Save Themselves

A few months ago I spoke at the American Institute of Cooperation and mentioned the importance of the movement phase of cooperation. I understand that some of the hard-headed, successful cooperative managers did not care for what I said. Some of them are undoubtedly convinced that the sole condition of cooperative success is technical and business efficiency. Both of these are necessary but they aren't enough to win the battles for cooperatives. I suspect there are those who think that only technical know how and business efficiency are necessary in conservation work. Everybody knows that scientists and technicians must be the brains of the big job in conservation but not everybody knows that it was only after conservation got to be a movement that the scientists and technicians got the opportunity to really do their stuff.

I don't expect to discredit the roles of technicians and scientists, but scientists and science alone can't save us. After all the people must save themselves. What I want to make clear is that they can't and never have done it as individuals. They have done it by organizing people's movements like democracy, Christianity, education, cooperation, and conservation.

A movement as a whole is a vague and nebulous thing. For that reason most people either don't clearly see its operation or worse yet they think it is a sentimental fiction. The reason it is vague is because it is made up of many and such diverse elements, many of which have little more to contribute than sentiment and good will. The reason it is nebulous is because it is a world in the making, a world of public opinion, sentiment and faith. If, however, a large segment of a society comes to feel or know that a major adjustment needs to be made, that is a real contribution. If the maladjustment isn't recognized or felt nobody does anything. If only a segment of society is conscious of the needed adjustment they are not listened to, no matter whether they are propagandists, preachers, or scientists. This was the case with our land resources in this country for generations.

Security and Conservation Are Laws of Nature

For three hundred years we built a great civilization, and developed a high standard of living by the techniques of expansion, exploitation, and speculation. Our undeveloped natural resources were so great and our population so small that we succeeded beyond our wildest hopes. A belief in expansion, exploitation, and speculation became our creed. But gradually, imperceptibly, things changed. We changed them by following our old creed to the point where it was proved to be a fallacy. Now our creed is changing, changing to a belief in the need for conservation and a desire for security. This is natural and was inevitable because security and conservation are laws of nature and even we of prosperous America can't and won't violate them forever.

Dr. Carl C. Taylor is head of the Division of Farm Population and Rural Welfare, Bureau of Agricultural Economics, United States Department of Agriculture. His headquarters are in Washington, D. C. Dr. Taylor was formerly President of the American Sociological Society and is the author of numerous bulletins and papers.

We are known as a great scientific nation but it would seem that we should have known better than to destroy and deplete our land resources. But science alone didn't and won't save us. The people must save themselves. They always do so, if at all, by means of movements, at first vague and nebulous but gradually becoming more intelligent, better focused on methods of accomplishment, more widely supported, and more comprehensive.

At this moment it is only about the conservation of our soils that the general public has become deeply concerned. It isn't yet fully awake to the need for water, forest, and wild life conservation. I wouldn't have too much faith that it would get concerned for a long time if I didn't know how movements operate. Once they get going they become a religion and as such assume the role of saving the world. If you don't believe this look at the democratic movement, the communist movement, the public education movement, the youth movement in some sections of the world. Their adherents have faith in their power of salvation. The conservation movement can and will sooner or later have this same faith.

The soil conservation movement has already moved far beyond the technical job of building terraces and check dams and contour and strip farming. It is calling for a national land policy and some of its adherents are calling for a national population policy. The Soil Conservation Society of America has in its membership many persons who are interested in timber, water, and wild life conservation. The top men of the Society are far more than soil technicians. There are other evidences that the conservation movement in the United States is becoming a people's movement and this is tremendously significant for all real movements are people's movements. Until they become such they don't get anywhere. I have written this whole piece just to say that, because I have a notion it will help some high powered, hard-working conservation technicians to appreciate a lot of non-technical people who have joined them in this task.

Land Resources Are the Concern of Millions

We have never had a land revolution in the United States because land ownership and/or control has been widely distributed among our people and because we have had such a favorable land-population ratio. We are pretty much an exception in the world in this respect. Elsewhere land problems have stimulated some of the most violent and sustained revolutions known. There have been a great many revolts by serfs and peasants in Europe. The Mexican revolution was in fact a revolt of landless farmers. The land reform movement in Japan is the heart of an attempt to democratize that society. Italy is on the constant verge of a land revolt right now. But we never will have a land revolt if we vigorously attack our chief two land problems, tenancy and conservation.

The reasons there have been so many land revolts throughout the world and throughout history is because land has always been the most basic of all natural resources. Other natural resources are important too, but no one has ever been able to start a people's movement for their conservation. I am sure that the reason for this is that the individual ownership and economic exploitation of these other resources have not been widely distributed in the hands of the people. The production of coal and oil, for instance, have been chiefly the concern of a relative few. Timber and water resources have been the concern of governments. *Land resources are the concern of millions of individuals and families.*

Because a successful movement requires the concern of a great many people it generally develops slowly. In fact most movements develop so slowly that many of them die a-bornin or make a lot of false starts before they get going. One doesn't have to go outside the conservation movement to illustrate these types of behavior for it was a long while ago that conservation "voices in the wilderness" first spoke in this country. I will not, however, recount that story. It is well known to practically everyone who reads this magazine.

The reason democratic society accomplishes its adjustments by movements rather than by revolts and revolutions is because "voices in the wilderness" are not suppressed and thus are listened to by at least some people. If these voices are speaking about things that are of concern to a large segment of the population they increase in volume and are listened to by an ever-increasing number of people. If they are speaking about things that are of concern to a large segment of the population, sooner or later something is done to correct the situation about which they speak because many persons other than scientists take up the issues and insist on action.

How Movements Are Started

When a movement is running at full tide its adherents consist of practical scientists, practical technicians, publicists, politicians, preachers, propagandists, interested citizens and mere hangers-on. You who know the conservation movement in the United States can name individuals in it who represent every one of these types of participants. Each one of us who is a part of it is one or the other of these types of participants. The interesting thing is that it doesn't make much difference which one of these types of persons starts promoting the movement provided all other types of persons get in and use their talents. *No movement, however, succeeds unless it*

is working on an adjustment, the need for which is felt by a great many people and unless it is guided by sound analytical and *technical knowledge.* There have been hundreds of abortive movements attempted which got no place because no great body of people recognized a need for them or because their sponsors were mere propagandists.

Some movements, however, are started by propagandists who scare people into a belief that some dire vague fate will befall them if they don't wake up to the situation. They see some need before the masses do. To their propaganda, the practical technicians and scientists are at first likely to react very critically and this is all right provided they don't belittle actual needs which the propagandists see. Sometimes, however, propagandists, publists, or preachers see people's needs and problems before scientists do.

Some movements are started by practical technicians and scientists. They, however, generally have to work in relative obscurity for years just because no one promotes what they are doing. The interesting and important facts are that a movement does not get going merely on the basis of scientific knowledge and that the accomplishments of practical technicians is frequently hidden under the basket unless some publicist or propagandist throws the light of public concern on what they are doing.

Early History of Conservation Movement

Now, let us look at the conservation movement in the United States in the light of these facts, first at its slow and spasmodic start and then at its present stage of development. Marsh's name and his statements of almost a century ago would not even be known by most members of today's conservation movement if a few people had not recently resurrected them for all of us. The Pinchot-Ballinger fight at the beginning of this century was little more than an episode until others widened and attempted to enliven the public concern about our natural resources. Even Theodore Roosevelt was not too successful with his Inland Waterways Commission and later his Natural Conservation Commission. The technical and public men on these commissions were competent but there was no widespread citizenship demand for a conservation movement and Congress failed to appropriate any money for the Conservation Commission.

Van Hise in his book on "The Conservation of Natural Resources in the United States," published in 1910, said "The modern conservation movement is the direct result of the work of scientific men." He also said, "Bringing an appreciation of the importance of conservation to the foreground of human consciousness is a work which cannot be done by one man or one organization in one year, or by many men and many organizations in many years. It is a campaign which will extend through generations." What he did not say was that scientists and educators alone could not get a conservation movement into full tide, in fact could not convert the conservation concerns of scientists into a movement. What was necessary was the development or growth of an intelligent consciousness on the part of hundreds of thousands of individuals of the need for conservation. I think the reason we have the great soil conservation movement, far outrunning a timber or mineral conservation movement, is because hundreds of thousands of farm families, thousands of local communities, whole States, and even the general public got concerned about the loss of our top soils when drought and dust storms hit us in the early '30's. Then hundreds of thousands of people began to listen to scientists who had been seeking audiences for generations. Publicists and newspaper men saw real human interest stories for articles and books. Ministers began to emphasize "stewardship of the soils" and propagandists, if you want to call them that, began to relate dramatic and tragic stories resulting from the lack of soil conservation.

I implied earlier that those who think a conservation movement is made up of only technical knowledge would not like what I have to say. I wonder if I was right. No scientist really enjoys having his light hid under a basket and all scientists get discouraged with being only "voices crying in the wilderness." They should, therefore, be very happy when the masses begin to understand them. As a matter of fact, scientists need to understand the very important truth that the big task of getting science used and scientific practices adopted is to convert science into folk knowledge and common sense.

Real Conservation Movement Now in Progress

Common sense is the type of knowledge the average fellow has about his own job. Until the knowledge which the scientists have is converted into the folk knowledge or common sense of the people who are concerned day by day with the natural resources, not much happens. When, however, the concerns of the scientists and the concerns of the common people are recognized as the same concern, a movement gets going. The interesting thing is that others than these two parties also get concerned, newspaper and magazine editors, book publishers, preachers, politicians, in fact, the whole public.

Attempting to be a student of the way movements develop, I was very much interested in the St. Louis

(*Continued on page* 114)

Soil Conservation and the Rule of Law

H. W. HANNAH

Two major causes, points out Mr. Hannah, are responsible for the inability of individual farmers and ranchers in some areas to completely solve their soil maintenance and erosion control problems. The first concerns the lack of initiative and procedural machinery in bringing group action to bear on group problems. The second problem concerns the presence of certain legal road blocks inherent in our common law system, and to some extent in our state statutes.

PROGRESS IN CHECKING wasteful soil usage in the United States is gratifying—but not great. Though there may be areas in which substantial numbers of individual farmers have done about all they can do on their own farms, their soil maintenance and erosion control problems are still not completely solved. Two major causes are responsible for this inability to finish the job: One is the lack of initiative and procedural machinery in bringing group action to bear on group problems; the other is the presence of certain legal road blocks inherent in our common law system, and to some extent in our state statutes. Then there is another problem of group concern to the soil conservationist, if we assume that the soil conservationist desires to build for the future, and that is how to insure the continuation of individual farm conservation plans which have been brought to fruition only with the expenditure of much time and energy and money, some of which represents an investment by the taxpayer. Stated more bluntly, how do we go about preventing the dissipation of creditable accomplishment?

We shall not tackle the problem of securing group action, important as it is, because it is primarily a social and educational consideration, though it may be implemented by legislation and impelled by grants-in-aid! We shall analyze and discuss the other two problems which have been posed—hindrance in the form of rules of law, and the legal possibilities for preventing dissipation.

Our system of property law—insofar as it is a system—is built around one central theme: every landowner shall have the most absolute freedom of use and disposition that the demands of society will permit. In cities the demands of society are important enough to impose many legal restrictions on the individual's ownership. In rural areas the demands of society are not so apparent, though there are many who would be willing to argue that they are just as great and just as important—but for different reasons. But the law has not viewed agricultural ownership in the same light as have the disciples of soil conservation. Therefore it is not surprising that we find some rather important rules of law which protect the individual by preventing him from properly conserving his soil!

Natural Drainage Rules Are Far-reaching

Let us examine for a moment the theory, religiously adhered to by the courts in nearly one-half of the United States, that surface water flowing in a natural depression must not be diverted so that it will enter the lower land at any point other than where the depression naturally enters the lower land. This is one of the cardinal principles of the civil law rule of natural drainage. Hand in hand with this rule goes another, that water cannot be brought through even a slight divide and made to flow on land which could not have received it in a state of nature.

In one of our Illinois counties there is more than a section of contiguous farmland, held by about a dozen owners, situated on top of and all around a prominence locally known as "the Dome." All of these owners but one are willing to forget fence lines, work out mutual agreements, have surveys made and put in effective terraces. But even if they can work out an agreement among themselves, all of the farmers between their land and an adequate outlet for their waterways can complain that they are receiving surface waters which have been diverted from natural channels, that this violates the natural drainage rules of Illinois and that this additional water must be restored to its former natural channels. In view of past court decisions the complainants would win the day and the system of terraces and waterways would become either useless or very much limited in value.

Let us examine another drainage rule, the one which holds that surface waters cannot be dammed so that they back up on the higher land, but which at the same time holds that an upper owner is legally powerless, even though his whole farm is flooded, if the water backs up

This paper by H. W. Hannah was presented at the Annual Meeting of the American Association for the Advancement of Science held in New York City, December 26-31, 1949. It was one of four papers featured on a "Symposium: Whither Soil Conservation?" Mr. Hannah is Professor of Agricultural Law, Department of Agricultural Economics, University of Illinois, Urbana, Illinois.

simply because the lower owner has permitted his channel to clog and fill and grow up in willows. To the average man there appears to be something irreconciliably inconsistent in these conclusions. The conservation-minded farmer must place his check dam with extreme caution—the proud owner of the clogged channel can stand by with impunity while his neighbor's corn crop disappears beneath a spring freshet.

Easements Are Important

Let us examine for a moment another phase of property law—that having to do with the acquisition of rights in the land of another. If my eaves overhang my neighbor's lot and he does nothing to prevent my water from dripping on his yard, I may eventually acquire a right to continue the drip. If I throw up a sod dam along my fence line and prevent the escape of surface water from the land of my upper neighbor, and he does not exercise his right to enjoin my action I may acquire a right to maintain the dam, despite objections from subsequent owners of the upper land. The length of the necessary period of adverse continuous use varies from state to state, but is generally between 10 and 20 years.

These easements assume importance in soil conservation activity because they represent legal safeguards to the status quo—a fact which may be either good or bad in particular situations depending on the desirability of the practices prohibited or established by the easement. Like rules of natural drainage easements may interfere with the right to build terraces, waterways, check dams and other essential soil conservation structures. On the other hand easements, particularly those created by deed and for a consideration, may be the means of securing those rights necessary to build and extend such structures. Easements thus acquired have long been used to acquire rights of travel and drainage across the lands of other owners.

Support Provides Legal Protection

We have indicated that strict adherence to certain rules of natural drainage and to certain rights acquired by prescriptive use many times curbs needed soil conservation activity on farmland. Let us now turn to a rule which because of the limited construction placed upon it by the courts, in effect permits one landowner to partially destroy the efforts of another. The principle of lateral support holds that adjoining property owners must not dig away their own soil and permit the neighbor's soil to cave in. There is much reason in such a rule —particularly as it applies to city properties. But its significance to agriculture is negligible because the rule applies only to positive acts of the adjoining landowner and not to his negligence in permitting the washing or subsidence of his land with resulting damage to adjoining property. An extension of the principle of lateral support to include these last mentioned situations, with proper safeguards in its application, would provide needed additional legal protection to the conscientious farmer.

There is another principle similar to lateral support which holds that in the absence of specific agreement anyone who tunnels under the property of another must support the surface so it will not cave in. This is referred to as the principle of subjacent support. Its operation is confined almost exclusively to mining areas. The courts have interpreted this principle so that it really gives only a relative, not an absolute right, to the surface owner. If the mine operator can show that a reasonable effort was made to prop mine tunnels, then damages of a substantial nature will seldom be awarded.

At this point one might venture a tentative conclusion about all of the rules discussed thus far. They have been shaped around the concept that equity to the human element is all important and that there is no such thing as equity to the soil itself. If we care to become even more venturesome and like occasionally to pull down the wrath of accumulated judicial lore around our ears, we might say that court decisions, and hence the common law itself, seldom reflect the larger issues at stake, since the individual issue is after all the all-important one to the court. Perhaps this accounts in part for the tremendous growth of legislation and the administrative rule as devices for recognizing the larger issues. If this is true then we might expect to see disparity between the court-made rule of law and corrective legislation. Actually this is what we find, and lawyers are familiar with the phraseology "legislation to cure the defects of the common law."

We have intimated that the concepts of natural drainage, easements, lateral and subjacent support are surrounded by rules, many of which are detrimental to thoroughgoing soil conservation activity. In the same category, but of less importance, may be placed our concepts of trespass, fencing responsibility and boundaries.

Trespass law holds in effect that there are only certain places where a man has a legal right to set foot, and that he must abstain from setting foot elsewhere. Obviously this theory has qualifications. But none of the qualifications thus far developed have grown out of any feeling that soil conservation on a particular farm requires an invasion of established rules of trespass. Yet without a legislative waiver or personal agreement how can necessary surveys be made, and how can terraces, waterways and other structures be laid out, when the

accomplishment of the project involves trespass on adjoining property?

Fence statutes, where they exist, are made to fit the prevailing concepts of property law—that each parcel is distinct, that any invasion of another man's land is to be prevented, and that there should be a sharing of expense in building and maintaining line and division fences. Though it is not our purpose at this time to discuss the legislation which has influenced American land policy, we might pause long enough to surmise that despite all the admirable features of the rectangular system of survey, it has impeded the cause of conservation by creating unnatural boundaries. However we may also surmise that any other system which might have been used would have created like difficulties, if similar policies regarding ownership and disposition had been followed. If the line of reasoning we are now establishing is pursued far enough, it will result in a finding that progress in achieving soil conservation is impeded by small holdings and many owners. Government and its programs could be so simple if it were not for people! Since we are now hinting at two of the economists' 64 dollar questions—how big should a farm be, and how many farm operators are needed in the United States—we will pass on to something which has a more tangible bearing on the subject under discussion.

Tenure Relations and Rules of Descent

When two or more people share the ownership of a farm the chance that a wise conservation program will be followed is materially lessened. When farms are leased or mortgaged or when life tenancies are created, naturally opposing interests come into being. It is tenant versus landlord, mortgagor versus mortgagee, and life tenant versus remainderman. The common law doctrine of waste as applied to either of these three relationships is not effective in insuring a conserving system of farming. Happily a substantial percentage of landlords and tenants are gradually adopting the view that what is good for the soil is ultimately good for each of them, regardless of what a lax set of common law rules regarding "good husbandry" and "waste" might permit. Whether this view is well entrenched or has only a toehold is not certain. We can tell better after the next depression.

When a farmer dies intestate the law of his state indulges in some presumptions. It presumes that he would like to have his property distributed among all his legal heirs, no matter how infinitesimal the smallest portion might be. It presumes that he would like to have these interests undivided, so the legal heirs can enjoy the pleasant experience of operating the farm as an estate, or can enjoy the somewhat more rigorous experience of dividing it so that everyone is satisfied. The rules under which farm property is thus mistreated vary slightly from state to state, but the cardinal objective of all schemes of descent is to place the deceased's property in the hands of those persons whom the legislators feel the average intestate would have favored had he left a will. It is doubtful if the effect of particular rules on land management and use received much or any consideration when systems of descent were established. Such legislative conclusions, essential though they may seem, cannot but result in some monstrous miscarriages of intent, particularly for those property owners who would rather have had anyone but their relatives enjoy their property.

Although there are rules of law adverse to the desires of particular persons at particular times, and although there may be no rule of law where one seems to be needed, the adaptability of the law to voluntary agreement and contract is truly remarkable. Through mutual agreement adjoining property owners can overcome practically all of the shortcomings of our common law system and in many instances also the effect of undesirable statutes.

Covenants Running with the Land

Suppose a small group of farm owners cooperate in establishing an erosion control program on their farms. The full benefit of the plan will not be realized for several years. In the meantime, control structures must be maintained and improved, and field operations carried out in conformity with the plan. Two years later one of the owners sells his interest to a purchaser who is not concerned about maintaining the plan. What can the other owners do? Nothing; nor will the law of trespass permit them to enter the purchaser's property to preserve the scheme, even at their own expense. This suggests the necessity for something which will be binding on all who succeed to the title of any of the original cooperators. Mutual covenants, so executed that they will run with the land, are one answer. Such covenants are not new devices. They have been a feature of real property law for a long time, and are honored by many rules of construction, some of which are sufficiently tenuous to discourage penetration except by the the more astute in the legal profession. Such a covenant or promise should be in writing, executed like a deed, and couched in terms which clearly show that some duty or obligation of a continuing nature, affecting the land, is to be imposed on all persons who succeed to the title of particular property. Covenants to maintain a tile line or keep a division fence in repair are familiar examples. The maintenance of terraces, waterways, dams and other structures can be

covered by a mutual agreement creating covenants. Thus employed it is a usable device for insuring longevity to permanent conservation improvements. However, it has its limitations. Landowners are loath to reduce the merchantability of their titles by creating conditions which attach to the land; legal questions regarding the sufficiency of the language can always be raised; and when a breach of covenant is not followed by appropriate legal action the right to enforce the covenant may be lost.

Nuisance Theory May Have Possibilities

One of the curbs which our legal system provides for the unbridled enjoyment of private property is contained in the law of nuisance. Roughly speaking, a man is not permitted to use his property so that injury results to his neighbor, or so that his neighbor's enjoyment is curtailed. Obviously we are again dealing with a relative right, for actually there may be extensive impairment of an owner's ability to use his property and no legal remedy. We have already examined two such instances—the failure to keep drainage channels clear and the failure to control fence line erosion, with resulting harm to adjoining property owners. However, the very fact that nuisance is a relative theory means that it may have untapped possibilities as courts and lawyers become better informed and more conscious of the soil conservation problem. If the theory can be employed to prevent stream pollution, sulphur deposition, and the establishment in particular localities of glue factories, rendering plants and undertaking parlors, it certainly should have some utility in the field of erosion control—not to mention weed control and drainage.

Agreements Create Contractual Rights

State and federal agencies in charge of programs which involve cooperation with individuals usually operate under written agreements. These agreements define the relationship of the parties, describe the work that is being undertaken and specify the duties and obligations of each. Soil conservation districts must execute a cooperative agreement (the word "contract" is avoided for policy reasons) with farm cooperators because it is one of the conditions for continued assistance from the Soil Conservation Service. These memoranda offer a tactical medium for perpetuating a plan once it is put into effect, insofar as the threat of withdrawing assistance will induce the farmer to continue. Actually these agreements do create contractual rights, and there is no reason, legally speaking, why a district could not employ any recognized legal means to enforce the contract—specific performance, injunction or a suit for damages for example. But some one will want to say at this point that any long time advantages coming from the memorandum must result from converting the farmer, not from threatening him. However, there is a very practical legal question involved, and that is to what extent Mr. Taxpayer has a right to insist that his agencies require from farmers agreements which will insure a satisfactory return on the tax dollar. In other words we are here confronted, as we are in many other areas of government, with the familiar query: "How much can we rely on education and voluntary cooperation, and how far must we move in the direction of government control?"

Zoning Ordinances Should Be Developed

Happily there are some devices which fit in between individual action at one extreme and state or federal action at the other. Local governmental bodies organized as public corporations may be empowered to do much of the necessary regulating and thus remove from it the stigma of imposition from above. Drainage and irrigation districts are examples of long standing. More recent in origin and less extensively employed are county, regional or rural zoning boards or commissions, with authority to limit particular classifiable types of land to specified uses or at least to designate certain uses which cannot be made. With a few exceptions like the state of Wisconsin, most state enabling acts, if they exist at all, are aimed more at controlling undesirable developments on the fringes of municipalities than they are in effecting any changes in agricultural land use. As a matter of fact some of these laws exclude farms from their provisions. The zoning device, however, should be developed and used more extensively because no other local means is so well designed to take into account the cost of extending public services and the factors that make for community growth and improvement in formulating local land use policies.

Regulations Will Lead a Trouble Existence

What role may soil conservation districts come to play in view of their power to adopt land use regulations? That is a difficult question. First of all there is the problem of constitutionality. Would land use regulations adopted in accordance with the law as it appears in most states, providing for publication or proposed ordinances, hearing and referenda, stand the test of constitutionality? Probably so. But among other things they would need to be well drafted and would have to be backed by necessary technical finding. This is probably the most important consideration of all. We can assume that conserving soil resources is within the police power of the state, and we can assume that soil conservation districts are properly constituted public corporations,

but we cannot assume that any particular land use regulation will stand the test of reasonableness unless it is definitive in its terms, certain in its application, productive of a result which benefits the public, and based on findings which are scientifically sound. With these limitations in mind, try to imagine how percent of slope, soil texture and profile, cropping history, present use and all the other factors which should be considered are to be melted into a workable land use regulation. It can be done. We know that because two Colorado districts adopted regulations which were sustained by two different courts of original jurisdiction in Colorado. But that is only a beginning. Ideally land use regulations should be a means of protecting the conquests which a district is able to make, and of coercing the few. Until some conquest has been made, and until those who need to be coerced are "the few," land use regulations, if brought into being, will lead a troubled existence.

Improvements in State Legislation Needed

Most of the laws affecting our individual rights in property are state laws. Mortgages, deeds, wills, descent, inheritance, condemnation, easements, prescriptive use, leases—all of these are controlled by state law. And all of them, consciously or unconsciously, set policies which vitally affect attitudes toward conservation. How well is the soil protected during foreclosure proceedings and during the redemption period which follows—and during the months or years which led up to foreclosure? What conditions do deeds contain that relate to preservation of the real estate? What curbs do the statutes permitting men to make wills contain? And the right to make a will is not inherent; it is created only by statute. What effective restraints do our laws of descent contain to prevent the splitting of land into minute and unworkable units? How wise is our tax sale and forfeiture procedure? What restraints may be imposed on the life tenant, the farm tenant, the trustee to prevent unwise use and dissipation of the property? The answers to these questions are not encouraging if we consider land as an important natural resource. To what extent these laws can be rewritten or changed or amended to give greater protection to this basic resource, it is not possible to say. Certainly some improvement may be made without altering our present property concepts, but before property law generally can be made to effectively serve the public interest in soil resources, there must be a shift in viewpoint with regard to the size of the bundle of rights possessed by the individual.

Conclusion

For the most part, the rules of law within or in spite of which soil conservation activity must be pursued were designed to satisfy a set of human desires and to promote an economic and legal expediency which regarded land as simply another item for sale, barter, use, and speculation. We are apt to feel that these rules, because of their long standing and because they have in the public mind become associated with the democratic processes, are unassailable, and that to suggest any change or revision is to suggest a modification of our form of government. In my opinion the relationship does not run that deep. It is more than likely that a retention of certain controls by the federal government at the time it was making a wholesale disposition of public lands could have supplied the needed protective element, and had that been done we today might never have guessed but what that was the democratic way to balance the interests of the individual and the interests of the public. In lieu of this retained control we have witnessed the spectacle of the federal government attempting to buy soil conservation from any farmer who will voluntarily make the assumed sacrifice, using as a yardstick no better guide than acres taken out of depleting crops or evidence that some limestone was spread or a terrace constructed.

In spite of the nature of some government programs, it is fair to say that federal legislation and state educational and information activities relative to soil conservation have moved forward more rapidly than either local action or needed judicial and statutory alteration of certain impeding rules of property law. If this is true, then perhaps during the next few years we should expend more effort on some of these local impediments to the conservation of the nation's basic resource.

". . . The period of exploration and unsystematic, sporadic advance, which seemed to the nineteenth century to embody the essential characteristics of the new economy, is rapidly coming to an end. We are now faced with the period of consolidation and systematic assimilation. Western civilization as a whole, in other words, is in the condition that new pioneering countries like the United States found themselves in, once all their free lands had been taken up and their main lines of transportation and communication laid out: it must now begin to settle down and make the most of what it has. Our machine system is beginning to approach a state of internal equilibrium. Dynamic equilbrium, not indefinite progress, is the mark of the opening age: balance, not rapid one-sided advance: conservation, not reckless pillage."

LEWIS MUMFORD, *in Technics and Civilization.*

Quail Studies on a River Floodplain

WALTER ROSENE, JR.

Studies in the Southeast show that farm lands improved with modern cropping and soil building practices produced more quail than unimproved lands. This is based on the proper interspersion of cover types and particularly the amount of borderline between row-crops and cover suitable for nesting.

THE BOBWHITE QUAIL (*Colinus virginianus*) is the most important game bird of the Southeast. It is common throughout most of this region, highest populations being found on cleared lands with a good interspersion of brushy areas and cultivated fields. As it prefers this type of range, its numbers may be significantly affected by changes in agricultural cropping systems.

In 1932 the Soil Erosion Service (now the Soil Conservation Service) inaugurated a land-use program featuring cover crops as an effective means of controlling erosion due to the run-off of surface water. To evaluate some of the consequence of this program, a comparative study of quail populations was undertaken in 1947 and 1948 on farms improved by modern practices and farms operated by older, less progressive methods.

The Study Area

In Etowah County, Alabama, the soil conservation program was first established in a bend of the Coosa River 12 miles northeast of Gadsden in the winter of 1940-41. The principle crops introduced for the purpose of retarding erosion and building soil fertility were kudzu (*Pueraria thunbergiana*), such winter legumes as vetch (*Vicia* spp.) and crimson clover (*Trifolium incarnatum*), grain sorghum (*Holcus sorghum*), oats (*Avena sativa*), perennial lespedeza (*Lespedeza sericea*), and the annual lespedezas, kobe and common (*L. striata*). To date, new crops and practices have been applied to about half the land in this area.

Other farms in this locality are operated under the old one-crop system of agriculture which emphasizes cotton and corn, with a small acreage in soybeans for hay. Such farms were considered to be "unimproved" and were used as controls in the present study. Improved farms were indiscriminately located among the unimproved. Some study farms adjoined land not used in this investigation.

Cropped fields in the area studied are on sandy, well-drained upland soils on first and second river terraces. Imperfectly drained soils, found in waterways running from uplands to the river, usually are in trees or pasture. Drainageways run through both improved and unimproved tracts, and woodland edges are uniformly distributed throughout the area.

At the beginning of the study, nine farms totalling 1007 acres were selected as having well developed soil conservation programs and 15 farms totalling 1651 acres were chosen as representing a contrasting sample of land managed by old farming methods. By the fall of 1947 two control farms, one 240 acres and the other 76, had established perennial hays and winter legumes on a substantial acreage. Therefore, they were reclassified and included in the improved group. Another farm of 94 acres, originally entered as improved, was changed to unimproved. The owner had conservation practices established but became discouraged and returned to former methods. Since these changes the acreage of improved land has remained 1228 and the unimproved 1429.

This farmland with its quail population might be called typical for the Floodplain, Piedmont, Limestone Valley and Upper Coastal Plain soils of the Southeast. Trespass was much the same on these farms as in other sections. Farmers on two of the conservation farms with a total of 260 acres, and two non-conservation farms of 214 acres, did not allow quail hunting. Other farmers allowed shooting by permission only, and the balance did not enforce trespass regulations.

Land Use Is an Important Factor

Land use on farms studied is given for three growing seasons from 1946 to 1948 (Table 1). The acreage changes between 1946 and 1947 resulted from the reclassification referred to above.

Improved and control farms differed principally in two ways: First, a much larger percentage of improved land was in soil binding crops to retard erosion. Secondly, although approximately the same percentage of each type was devoted to grazing, improved farms had larger acreages of "developed" pastures.

Walter Rosene, Jr., is an employee of the U. S. Fish and Wildlife Service with headquarters at Gadsden, Alabama. This paper is a contribution from the Patuxtent Research Refuge of the Branch of Wildlife Research, Fish and Wildlife Service. The study is a part of a program of wildlife investigations on agricultural lands under the supervision of Durward L. Allen. Thanks are due to Verne E. Davison, Regional Biologist for the Soil Conservation Service, for many favors and helpful suggestions.

Table 1. Land-use on Floodplain Farms

	1946				1947-48			
	Improved farms		*Unimproved farms*		*Improved farms*		*Unimproved farms*	
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Woodland	209	21	522	32	302	25	419	29
Grazed woods and unimproved pasture	48	5	149	9	39	3	127	9
Improved pasture	41	4	4		66	5	14	1
Homesites and roads	27	3	27	2	28	2	28	2
Cropland	682	67	950	57	793	65	841	59
Total	1007	100	1652	100	1228	100	1429	100

Open fields, including idle and fallow areas, were classed as cropland. The total of this land was ten percent greater on improved farms in 1946 and six percent greater in 1947-48. On improved farms a larger percentage of the total cropland was planted in perennial hay, winter legumes, small grain, grain sorghum and kobe lespedeza, in that order. In the same sequence unimproved farms had larger amounts of idle fields, cotton, soybeans and corn. Similar percentages of fallow land, orchard and truck crops were found on the two types.

Forest types in the drainageways were similar throughout the entire river bend. Loblolly pine (*Pinus taeda*), sweet gum (*Liquidambar styraciflua*) poplar (*Populus heterophylla*) and oaks (*Quercus* spp.) were the predominant species. On river banks the same hardwoods occurred but most of the pines had been removed.

Up to the time of this study no attempt had been made to establish field borders of bicolor (*Lespedeza bicolor*) or sericea on any farms of this area.

Cultural practices in agricultural crops were essentially the same on the two farm types. Native grasses that volunteer after cultivation were found in similar amounts and distribution on all cultivated land. Residues from row-crops did not vary significantly, but perennial hay and winter legumes on improved farms left a particularly large amount of residue on the soil.

Shrubby growth on woodland edges and in thickets was almost uniformly distributed on cultivated land. However, the larger percentage of idle land on unimproved farms produced more of such cover than was present on improved farms.

It is to be emphasized that the significant differences between improved and unimproved lands were in the use of croplands and the development of pasture land.

How Field Work Was Conducted

The procedure followed was a total count of coveys on improved and unimproved farms in February, March and April and again in October and November. Field work began in the spring of 1947 and continued to the spring of 1949. Direct counts of birds in the field were made by means of two well-trained setters. Coveys were flushed sufficiently to get a reliable count and to establish each as belonging to a given farm. If the range of a covey crossed a farm boundary it was studied carefully to determine where the covey fed and spent most of its time. This usually determined the farm to which the covey was assigned.

Farms were covered from one to several times, particular attention being given to thickets where birds might be missed. Many of the landowners already knew the location, and in some cases the size, of their coveys. Their observations were taken into consideration, but only personal records were used for purposes of inventory.

Conservation Farming Increases Quail Population

Results of the spring and fall inventories for 1947 and 1948 on the two farm types are given in Table 2. In these years sizes of spring coveys varied from one to sixteen birds. Fall coveys ranged from four to twenty-two birds.

On the entire area there was an increase in the total population during 1948. A similar increase was noted on other areas where population studies were in progress. Sportsmen and farmers also reported more quail in the 1948-49 hunting season. The increase in quail numbers on both improved and unimproved farms in 1948 probably was due to favorable weather during the nesting season. These climatic conditions prevailed generally throughout the Southeast and the effect was a widespread increase in quail.

Hunting pressure on these farms was heavy. Several farmers living on the study area have bird dogs and hunt quail. Others carry a gun when in the field and shoot birds when opportunity presents. Three other additional farmers in the community keep good dogs, hunt regularly, and are excellent shots. Further hunting pressure comes from Gadsden, a city of 75,000 people. As the whereabouts of most coveys are known locally the birds are readily found and persistently hunted.

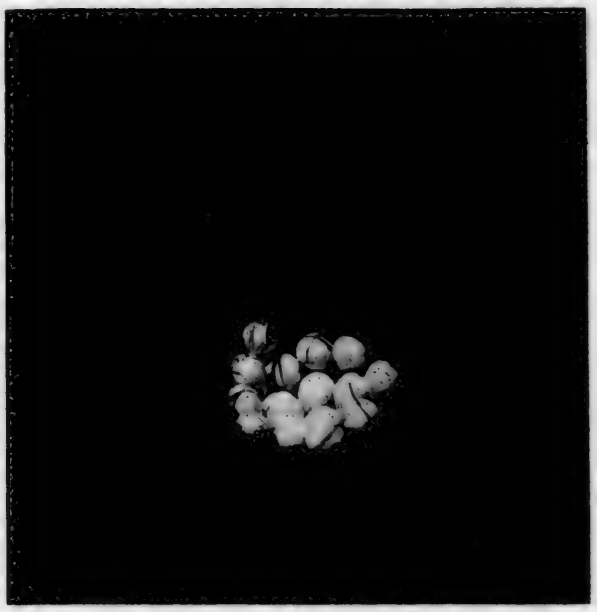

Figure 1.—A bobwhite quail nest with 15 eggs. This bird needs a grassy cover deep enough to hide its eggs.

Table 2.—*Frequency Distribution by Covey Size*

	Number of Coveys			
	1947		1948	
Birds in Covey	Spring	Fall	Spring	Fall
1	1		2	
2	1		1	
3	1			
4	3	1	2	
5	2	2	2	1
6	2	2	3	2
7		1		2
8	6	1	1	3
9				3
10	3	1		5
11		1		
12		5		6
13				
14	1	2		2
15		1		3
16	1	2		
17				
18		2		3
19				
20				1
21				
22		2		

	1947 Census		1948 Census	
	Spring	Fall	Spring	Fall
Coveys on Entire Area	21	23	11	31
Birds on Entire Area	148	255	48	351

Table 3 is a comparison of populations on the two land types. Improved lands had more birds in the spring each year and produced more quail each summer. In 1947 the average covey size was the same on the two farm types in the spring (seven birds) and nearly the same in the fall (12 and 11). In the spring of 1948 coveys averaged four birds on improved farms and six on unimproved. By fall of that year averages again were 12 and 11 respectively.

The post-hunting breeding population was different each year. Spring numbers in 1947 were larger than in 1948. But more breeders in 1947 failed to produce as many birds as a smaller number in 1948.

In the 1948 spring census only 48 birds were found on the entire area. Theoretically this made 24 pairs, assuming that the sex ratio was 1:1 and all were capable of breeding. Records show that by fall these 24 pairs had produced 31 coveys. This is an improbability, so it is likely that an influx of breeding birds from surrounding areas occurred in the spring of 1948. These farms apparently were desirable nesting sites which attracted birds from surrounding areas for the breeding season.

All of these farms were overshot in the 1947-48 hunting season, as ten of the remaining coveys had six birds or less after the season, an unfavorably low number of individuals per covey.

Quail Populations Vary

From this study the best quail ranges appeared to be on those farms where a variety of crops were grown. From other field experience it appears that quail make use of certain cultivated crops, such as annual and per-

Figure 2.—A female bobwhite quail covering her eggs. Notice the grass cover used for nesting. It is deep enough to conceal her.

Table 3.—*Inventory Data by Farm Type*

	Improved Farms				*Unimproved Farms*			
	1947		1948		1947		1948	
	Spring	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*	*Spring*	*Fall*
Coveys	12	15	7	19	9	7	4	12
Birds	84	175	25	223	64	80	23	128
Average size covey	7	12	4	12	7	11	6	11
Acres per covey	84	82	175	65	183	204	357	119
Acres per bird	12	7	49	6	26	18	62	11
Birds per 100 acres	8	14	2	18	4	6	2	9

ennial lespedeza, at all seasons while others are used only part of the year. Lands supporting a growth of native grasses and legumes offer excellent nesting cover in summer and the seeds of these plants are eaten in winter. Small amounts of uncut and ungrazed kudzu are desirable cover summer and winter. Corn, soybeans and grain sorghum are used primarily in winter. Seeds of these plants are good foods, as are the seeds of weeds that volunteer in corn and soybean fields after the crops are laid-by. Cotton, which is cleanly cultivated, winter legumes and fallow lands are not favored by quail at any season. These observations might explain the difference between populations on improved and unimproved study farms each spring and fall.

Summary and Conclusions

Farms improved with modern cropping and soil building practices produced more quail than unimproved lands. These higher populations evidently resulted from more favorable conditions for nesting and survival. An evident effect of improved farming practices is to increase the interspersion of crop types and particularly the amount of borderline between row-crops and cover suitable for nesting. Improved farms had a greater diversity of crops throughout the year while crops used on undeveloped farms were primarily those planted in rows and cultivated.

It is concluded that improved farming and soil conservation developments on farms in this river bend have not been detrimental to quail. On the contrary, they appear to have been instrumental in producing and maintaining higher populations of birds throughout the year.

Conservation as a Movement

(*Continued from page* 105)

meeting of the Soil Conservation Society of America. My part on the program was over in a short period of time but I sat continuously in the sessions of the program and through the business meeting, watching a real movement in progress. I talked to technicians, scientists, publicists, and propagandists in the lobbies. Every type of person whom I have listed here as necessary to a successful movement was on hand and doing his stuff, in fact was given the opportunity to do his stuff by the program committee. I heard soil technicians say they didn't savvy some of the high-brow stuff that was being dispensed and that they as day by day hard-working technicians didn't appreciate some of the propagandists who were honored at the convention. I listened to some of the high-powered theoretical men and some of the propagandists infer that the technical men were little more than hired labor who didn't really understand much about the significance of what they were doing. My own impression was that a real movement is in progress and that all of us together in that meeting were operating like a fine orchestra in which everybody from the bass drummer to the piccolo player was playing his part. The absence of any one of these parts would have been missed and would have proved that the conservation movement has not yet come fully into being.

Land Policy Must be Far Reaching

"The land policy of the United States up to the turn of the century was primarily one of transferring the public domain to private ownership as quickly as posible and leaving desirable adjustments to be worked out by the forces of competition. Little consideration was given to the uses for which lands were best adapted, or to the effective domands for products of the land. . . . It is now felt that an adequate land policy must provide not only for the preservation of soil fertility but also for the directed adjustment of production to demand, the economic utilization of marginal lands, and the maintenance of a balance among the various hegments of the economy."

ROLAND R. RENNE, *in Land Economics.*

A Method of Computing Conservation Benefits of a Range Program

CARROLL H. DWYER

How much can a rancher afford to spend to obtain desired levels of production from his range; also what are the benefits that he might expect. To answer these questions, Mr. Dwyer has developed and outlined a practical method of computing such benefits. Conservationists will find in the method a quick and easy means of determining costs and benefits for various uses.

TECHNICIANS, FARM PLANNERS and ranchers have long wanted an easily applied, reasonably accurate method of evaluating monetary benefits of range improvements. *The stockman, if a ranch owner, wants to know the benefits and costs of range improvement. He wants to know how much he can afford to spend to obtain desired levels of production from his range. If he is renting range he wants to know how much he can afford to pay for range of various kinds and conditions. The value of an acre of range must be measured by the net value of the meat, wool, or other livestock products it will produce in a year. Such factors as location and availability of water may modify the basic value to a greater or less degree.*

Basically, livestock production is a manufacturing enterprise—production of meat or livestock products from forage and grains. It should, therefore, be evaluated accordingly. The success of the enterprise will, like other manufacturing enterprises, depend on the efficiency of management, the quality of the finished product, the costs of production, and prices received for the products.

The value of a given range (to different operators) is extremely variable, depending on the size and efficiency of operation, the kind and condition of livestock, and the time of utilization. In determining value it becomes necessary to strike an average that will most closely represent the value to the majority of users regardless of their mode of operation. A number of methods have been used to determine the value of land and range improvement. This determination has generally been made by analyzing a "typical" farm or ranch budget. This method has many disadvantages. It is time consuming; requires a thorough knowledge of farm and ranch management; and requires the use of proper indices to reflect adequately the relationship of prices and costs. Some 30 to 50 judgment estimates are required for each budget. Consistency is impossible for no two persons will arrive at the same return, even though the same basic information was used in the beginning. When the results of the budget are expanded to a large ranch or to all the ranches in a watershed, the cumulative errors are expanded in proportion. This may give highly distorted results.

Range Is Valued By Its Rental Worth

The following method eliminates many of the variable factors inherent in the use of the budget. Instead of using the budget evaluation, the range is valued by its rental worth. This, in turn, is based on the value of estimated forage yields of the range.

Two methods of rental payment are in use. One is the payment of a flat rate per head per day, per month, or per season, while the second is to base rental on a share basis, generally one-fourth to one-third of the value of the weight gains made by livestock on range, computed at the prevailing market price of livestock. The share basis is an equitable method of rental to the landowner and stockman alike. It provides an incentive to the landowner to improve the range, and to the stockman to maintain the range in the best possible condition.

The proposed method of evaluation uses the share method of rental determination. Ranges are classified according to kind of site, and each site is graded as to range condition—the condition varying from excellent to very poor. The average safe rate of stocking is determined for each site and range condition class. It is then possible to predict fairly accurately the productive capacity in terms of pounds of animal products produced for each site and range condition. It is a well recognized fact that as the forage production of the land decreases,

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Carroll H. Dwyer is agricultural Economist for the Soil Conservation Service with headquarters at Portland, Oregon. Grateful acknowledgment is made by Mr. Dwyer to A. L. Sharp, W. T. White, and Waldo R. Fraudsen of the Soil Conservation Service for assistance in development and critical review of the proposed "Method of Computing Conservation Benefits of a Range Program."

Table 1. Forage Yields by Range Sites and Condition Classes, Eastern Alameda County, California

Range Condition Class	(1) Rolling Hills Deep Soils, S & W Facing Slopes	(2) Shallow & Rocky N & E Facing Slopes	(3) Upland Old Terrace Benches	(4) Over 16-inch Rainfall Steep N Facing Slopes	(5) Ridgetops and S Facing Slopes
	Acres Required per A. U. M. of Grazing				
Excellent	.6-.7	1.8-2.1	.7-.9	1.0-1.4	.9-1.2
	(.65)*	(1.95)*	(.8)*	(1.2)*	(1.1)*
Good	.7-1.0	2.1-3.0	.9-1.1	1.4-1.8	1.2-1.5
	(.85)	(2.5)	(1.0)	(1.6)	(1.35)
Fair	1.0-1.5	3.0-4.5	1.1-1.7	1.8-2.7	1.5-2.3
	(1.25)	(3.75)	(1.4)	(2.25)	(2.4)
Poor	1.5-3.0	4.5-9.0	1.7-3.3	2.7-5.4	2.3-4.5
	(2.25)	(6.75)	(2.5)	(4.0)	(3.4)
Very Poor	3.0-6.0	9.0-18.0	3.3-7.0	5.4-10.0	4.5-13.0
	(4.5)	(13.5)	(5.1)	(7.7)	(8.8)

*Numbers in parenthesis show average number of acres required per animal-unit-month of grazing.

the value of each acre of range declines.

To illustrate the proposed method of evaluation, an example is given below. A range condition survey of the eastern part of Alameda County, California, made by the Soil Conservation Service, shows that the area surveyed contains five recognized kinds of sites. Eastern Alameda County is predominately in annual grasses and weeds, with some perennial grasses and legumes. A summary of the grazing capacity of range sites by range condition classes is given in Table 1.

The livestockman, with reasonably good management and average good animals, should obtain between 50 and 70 pounds gain per animal unit per month. For the purpose of illustration, it is assumed that the A. U. M. gains average 60 pounds. The actual weight gained per A. U. M. for the various sites and range condition classes will vary, depending on the manner and time of use. Determination of the time and manner of use for an individual farm or range is properly a range management determination and is beyond the scope of this paper.

Determining Rental Value of Site Classes

To determine the rental value of the various site classes and range condition classes within the various sites, the following procedure is followed:

In the above case, the rental rate was taken as one-fourth of the gross gain at a price of twenty cents per pound of gain. Rental rates were determined for each of the other four sites in the same manner as shown for site 1. Results of those calculations are shown in Table 3.

Table 3. Per-Acre Values By Sites And Range Condition Classes

Range Condition Class	Rental Value by Sites 1	2	3	4	5
Excellent	$4.60	$1.55	$3.75	$2.50	$2.75
Good	3.55	1.20	3.00	1.90	2.20
Fair	2.40	0.80	2.15	1.35	1.25
Poor	1.35	0.35	1.00	0.65	0.75
Very Poor	0.65	0.20	0.50	0.30	0.30

To illustrate the method of determining the value of

Table 2. Determination of Monthly Per-Acre Rental Value of Site 1.

Range Condition Class	Assumed Pounds Gain per Month		Acres Required per AUM		Pounds Gain Per Acre		Prevailing Beef Price		Gross Value of Gain		Rental Share of Gain		Rental Value per Acre
Excellent	60	÷	.65	=	92	×	20c	=	18.40	÷	¼	=	$4.60
Good	60	÷	.85	=	71	×	20c	=	14.20	÷	¼	=	3.55
Fair	60	÷	1.25	=	48	×	20c	=	9.60	÷	¼	=	2.40
Poor	60	÷	2.50	=	27	×	20c	=	5.40	÷	¼	=	1.35
Very Poor	60	÷	4.50	=	13	×	20c	=	2.60	÷	¼	=	0.65

Table 4. Comparison Of Range Conditions, Acres Required Per AUM And Rental Values Of Site 1 Under Present And Future Conditions

2,500 acres—Present Condition

Range Condition Class	Percent of Range	Acres	Acres Required per AUM	AUM Grazing Capacity	Rental Rate per Acre	Rental Value of Range
Excellent	5	125	.65	192	$4.60	$ 575.00
Good	20	500	.85	588	3.55	1,775.00
Fair	35	875	1.25	700	2.40	2,100.00
Poor	30	750	2.25	344	1.35	1,012.50
Very Poor	10	250	4.50	56	.65	162.50
Total	100	2,500		1,880		$5,625.00
		Improved Conditions 10 Years Hence				
Excellent	20	500	.65	769	$4.60	$2,300.00
Good	35	875	.85	1,029	3.55	3,106.00
Fair	30	750	1.25	600	2.40	1,800.00
Poor	15	375	2.25	167	1.35	506.25
Very Poor	0	0	4.50	0	.65	0
Total	100	2,500		2,565		$7,712.25

A summary of the evaluations of the five sites of the hypothetical range is given in Table 5.

a range improvement program, the following *hypothetical* illustration is given. A 10,000 acre range in eastern Alameda County has deteriorated from overgrazing. What can the owner afford to spend to put it in good condition, and what may he expect in the way of benefits?

Past experience has shown that a properly designed and applied range improvement program will give definite improvements in range condition and in forage yield under normal climatic conditions. It is assumed that required range improvement practices will be followed. The hypothetical range is assumed to have the following acreages in the various sites.

Site 1	2,500 acres
" 2	1,500 "
" 3	4,000 "

Figure 1—Poor condition annual grass and forb range on steep north facing slopes—California. Range badly overgrazed.

" 4 ..... 1,500 "
" 5 ..... 500 "

Table 4 shows the method of comparison of present and future conditions at the end of ten years for Site 1. Each of the other sites is analyzed in the same manner.

Table 5 shows that the hypothetical 10,000 acre range has, at present, a grazing capacity of 5,712 animal unit months. The rental value of the range it $16,810.75. With improved range conditions, the forage production capacity of the range would be improved in ten years to a point where it would carry 7,774 animal unit months. The rental value of the range would be increased to $22,780.75. This represents a gain in rental value of $5,970.00 in the ten-year period, or an average annual gain of $597.00 per year.

How Much Can a Landowner Afford to Spend?

To determine the present value of the gain, or the amount the landowner could afford to spend today to get the amount returned in ten years at a predetermined rate of interest, the average annual gain of $597.00 is treated as an increasing annuity. That is, the average gain is $597.00 the first year, twice that amount the second year, etc. up to the tenth year. The present value of $597.00 treated as an increasing annuity, at five percent interest for ten years, is $597.00 × 39.37378[1] = $23,506.15. This means that the landowner could afford to spend $23,506.15 today to get this amount returned at five percent interest in ten years in the way of increased rental returns. At that time, the range would have a rental value of $5,970.00 per year greater than it now has.

Table 5. Comparison Summary Of Range Conditions, Forage Yield and Range Rental Rates—Present And Future Conditions

Condition Range Class	Acres	A.U.M. of Grazing	Rental Value of Range
	Present Condition		
Excellent	475	544	$ 1,628.25
Good	1,925	1,740	5,235.00
Fair	3,875	2,353	7,080.00
Poor	2,500	862	2,307.50
Very Poor	1,225	213	560.00
Total	10,000	5,712	$16,810.75
	Future Condition 10 Years Hence		
Excellent	1,900	2,202	$ 6,605.25
Good	3,500	3,120	9,318.50
Fair	3,300	2,026	5,703.25
Poor	1,225	420	1,138.75
Very Poor	75	6	15.00
Total	10,000	7,774	$22,780.75

[1]Factor for obtaining the present value of an annuity increasing by one per year for ten years at five percent interest. Factors for other period of time or rates of interest may be obtained from compound interest and annuity tables. The use of various annuity factors is a standard practice with all financial institutions.

Figure 2—Good condition annual grass and forb range on rolling hills with deep soils, south and west facing slopes—California. Cover mainly wild oats (*avena fatua*).

Photo by Herbert W. Graham

Rice terraces near Benaue, Mountain Province, Luzon, Philippines. Built by the native Ifugaos (Igorots), these magnificent structures, involving an intricate system, have been in use for centuries, transforming the forested landscape.

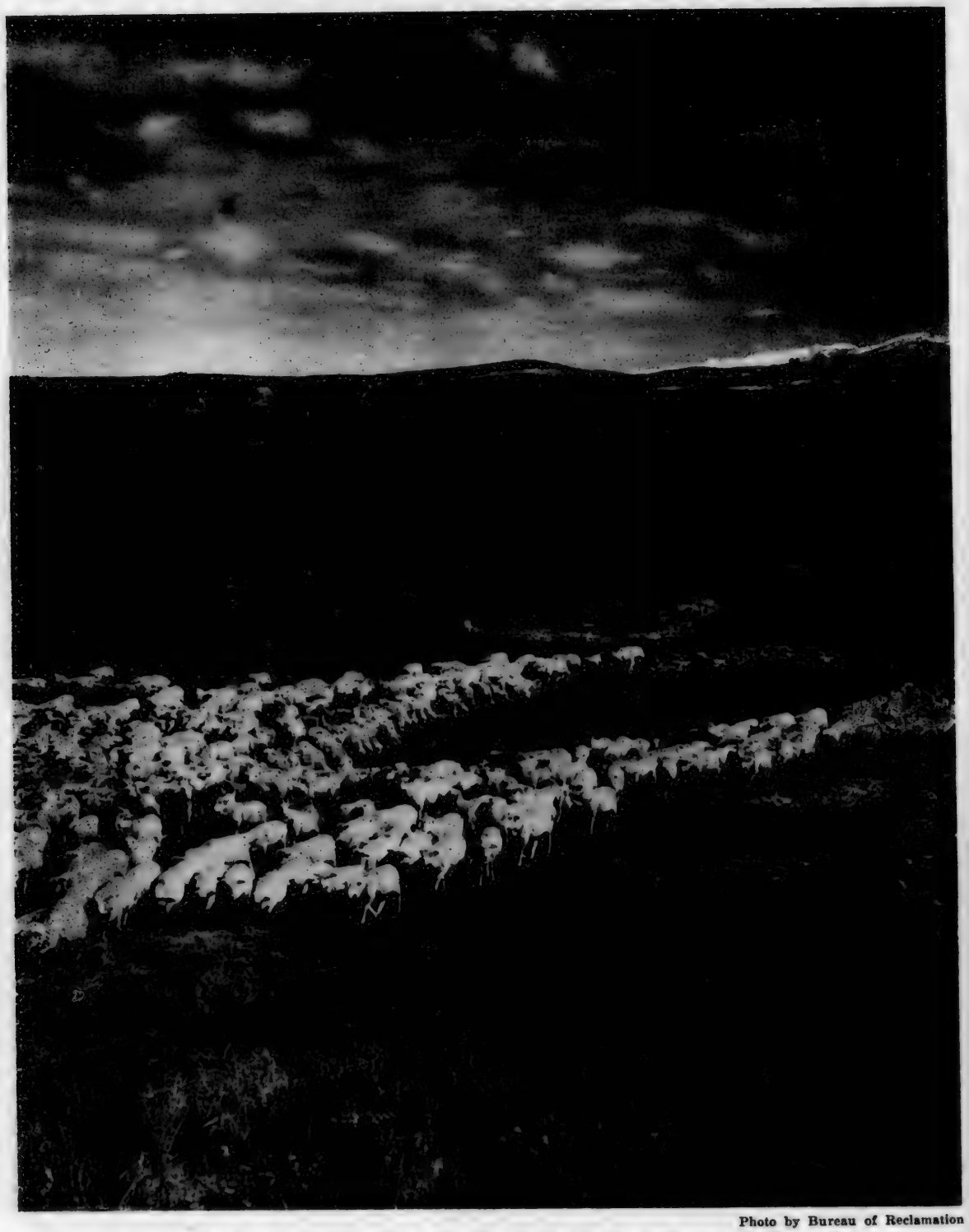


Photo by Bureau of Reclamation

Sheep head for the reservoir and a long cool drink. Spring development facilitates the distribution of grazing on the range, thereby reducing the concentration of livestock around old established watering places.

Photo by the Soil Conservation Service

Farm land flooded during the spring of 1950 along the Red River north of Grand Forks, North Dakota. Flood waters carry fertile soil from agricultural lands and cause destruction to property within its course. Conservation measures are needed to help keep the soil intact and prevent damage to property.

Photo by the Soil Conservation Service

Farm ponds have many uses. This farm boy is enjoying a swim after spending a hard day in the harvest field. More than 15 to 20 additional young people from nearby farms also use the pond for swimming, fishing, and skating.

Figure 3—Excellent condition annual grass and forb range on Upland old terrace benches—California. Cover consists of a high proportion of desirable grasses and forbs.

An arbitrary period of ten years was used to measure value, as most operators desire to have their investment returned in a reasonably short time. Actually, the use of short period values or benefits is a very conservative evaluation. Theoretically, the benefits of range improvement, if the range is properly managed, will continue for an indefinite period of time. Therefore, the ten year evaluation represents but a fourth to a third of the potential benefits. Its use does, however, provide a significant safety factor. It should also be pointed out that benefits from range improvement may not be apparent for several years, particularly in arid regions. If a significant lapse of time occurs before benefits appear, the present value of the benefits would require downward adjustment by use of proper discount factors.

It is recognized that the price of livestock will fluctuate from year to year. If the rental rate is based on a percentage of the gain, the rental rate will fluctuate in direct proportion to the price of livestock. The attached chart offers a quick, easy method of converting rates to different price levels once the rental rate is determined for any particular price level.

The benefits of a conservation program applied on range land can be measured in a somewhat different manner by computing, from the expected rentals, the increased capital value of the land.

Assuming that 40 percent of the rental return is required for fixed and operating expenses, the remainder could be capitalized at an acceptable rate of interest to reflect land value. Assuming that net returns, (gross —40%) are capitalized at five percent, a rate often used to reflect land value, Table 6 will illustrate the changes in capitalized values.

Table 6. Capitalized Value Per Acre—Present And Future Condition (5 Percent Capitalization)

Range Condition Class	Weighted Rental Value per Acre	Expenses	Available for Capitalization	Capitalized Value
Present Condition				
Excellent	$2.99	$1.19	$1.80	$36.00
Good	2.72	1.08	1.64	32.80
Fair	1.83	.73	1.10	22.00
Poor	.92	.37	.55	11.00
Very Poor	.46	.18	.28	5.60
Future Condition				
Excellent	$3.48	$1.39	$2.09	$41.80
Good	2.66	1.06	1.60	32.00
Fair	1.73	.69	1.04	20.80
Poor	.93	.37	.56	11.20
Very Poor	.20	.08	.12	2.40

Table 7 illustrates the change which occurs in the capitalized value of the range under present conditions and assumed conditions ten years hence.

Table 7. Capitalized Value Of 10,000 Acre Range—Eastern Alameda County, California—Under Present And Future Conditions 10 Years Hence

Present Condition

Range Condition Class	Acres	Capitalized Value per Acre (Weighted)	Capitalized Value of Range
Excellent	475	$36.00	$ 17,100.00
Good	1,925	32.80	63,140.00
Fair	3,875	32.00	85,250.00
Poor	2,500	11.00	27,500.00
Very Poor	1,225	5.60	6,860.00
Total	10,000		$199,850.00

Assumed Future Condition 10 Years Hence

Range Condition Class	Weighted Rental Value per Acre	Expenses	Available for Capitalization	Capitalized Value
Excellent		1,900	$41.80	$ 79,420.00
Good		3,500	32.00	112,000.00
Fair		3,300	20.80	68,640.00
Poor		1,225	11.20	13,720.00
Very Poor		75	2.40	180.00
Total		10,000		$273,960.00

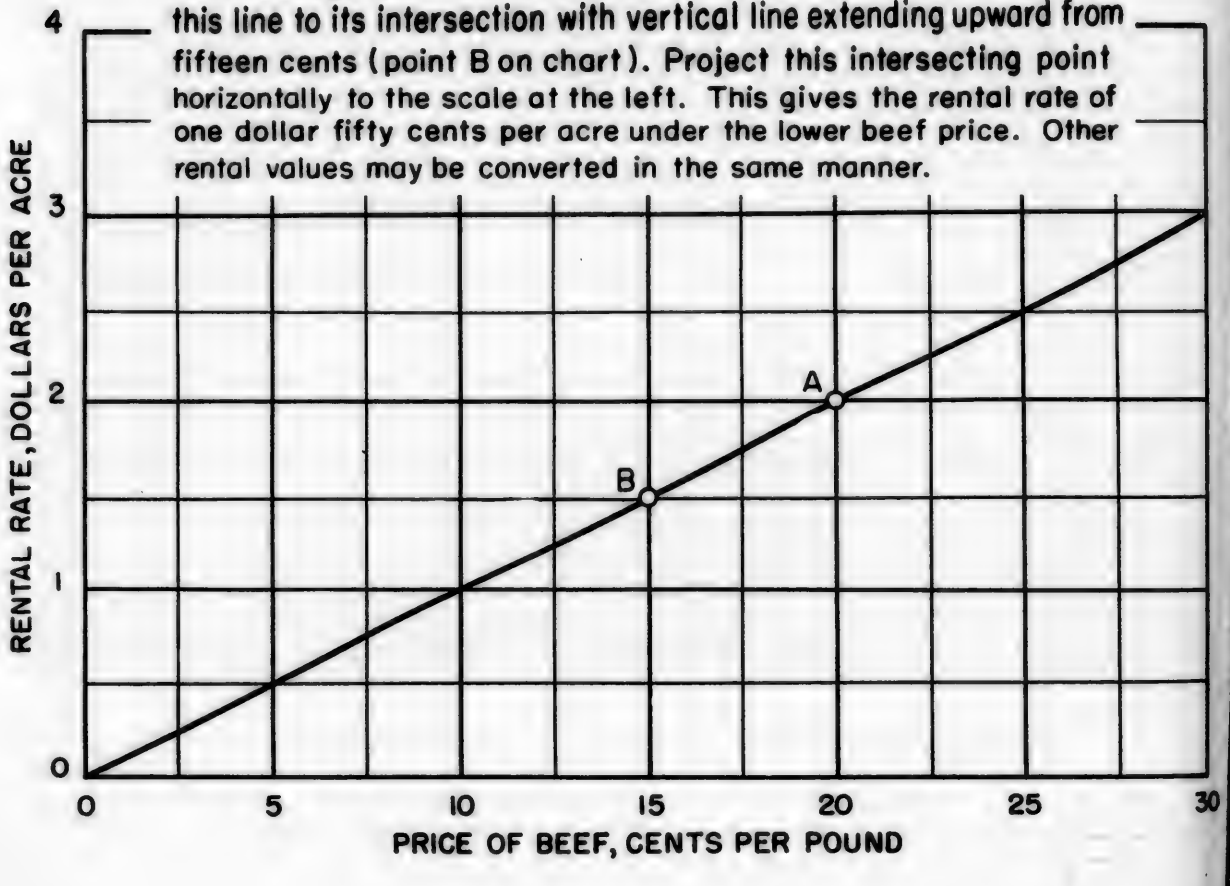
The preceding table shows that there would be a gain in capitalized value of $74,110.00 in the ten-year period. This represents an average capital value gain of $7.41 per acre for the 10,000 acre range.

(*Continued on page* 126)

CONVERSION CHART

Illustration of use:

Beef price is twenty cents per pound and the rental of a given range is worth two dollar per acre (point A on chart). To convert to a rental rate based on beef at fifteen cents per pound, draw a diagonal line through point A to point of origin (O), follow this line to its intersection with vertical line extending upward from fifteen cents (point B on chart). Project this intersecting point horizontally to the scale at the left. This gives the rental rate of one dollar fifty cents per acre under the lower beef price. Other rental values may be converted in the same manner.



Land Use and Trout Streams

GEOFFREY E. GREENE

Once-productive trout streams can be restored by the control of stream temperatures through good watershed management. This, according to Geoffrey Greene, involves careful manipulation of vegetation and other kinds of land use practices. To accomplish this it is important that all aspects of a watershed be developed as a unit rather than on a piecemeal basis.

IN MANY SECTIONS of the United States once-productive trout streams have little or no sport value today. This is largely caused by changes in the trout habitat conditions of the stream brought about by logging, road construction, overgrazing, fire, and clearing land for agriculture.

Trout can withstand a wide range of acidity, alkalinity, and carbon-dioxide tension. On the other hand, siltation has been found to be very detrimental to the natural reproduction of trout. Within the past decade investigations of habitat conditions have singled out stream temperatures as the most important factor in the distribution and migration of trout. Temperatures also influence the natural production of the aquatic organisms upon which trout feed. All species of fish are sensitive to thermal fluctuations of their environment, and trout are especially sensitive to any changes near their upper limit of tolerance. This means that the fish prefer cooler water and will often migrate to it.

There is some controversy as to the exact limits of temperature for trout; however, Needham's table for "Ideal and Maximum Temperature Limits For Trout" still holds true with the exception that the maximum limit for rainbow and brown trout is now considered to be 80 degrees[1] (table 1).

Table 1.—*Ideal and maximum temperatures for trout*[1]

Species	Ideal Temperature	Maximum Limit
Rainbow (Salmo gairdnerii)	70-80°	83°
Eastern Brook (Salvelinus fontinalis)	66°	75°
Brown or Lock Leven (Salmo trutta)	70-80°	81°

[1]Adapted from Paul R. Needham's "Trout Streams," Comstock Publishing Company, Ithaca, N. Y. 1938.

[1]All temperatures were measured in degrees Fahrenheit.

An opportunity to measure stream temperature was provided by watershed studies in progress at the Coweeta Hydrologic Laboratory in western North Carolina, an experimental area under the administration of the Southeastern Forest Experiment Station. For a period of one year stream temperatures were measured from two mountain watersheds; one a typical farm, the other an undisturbed forest. The drainage area of the farm stream, originally supporting hardwood forest, has been under cultivation and pasturage for eight seasons. The adjacent forested control watershed supporting hardwoods with laurel and rhododendron understory was similar in size and topographic features.

The weekly maximum temperatures of the farm stream ranged from nine to twenty three degrees above those of the forest stream, or an average of 11.5 degrees (figure 1). The maximum temperature for the farm stream varied from 65 to as high as 79 degrees, whereas the forest stream never exceeded 66, which is considered the optimum temperature for brook trout. August was the warmest month for the farm stream, whereas the forest stream was warmest during the month of September. Both streams were coldest during the month of February, with the forest stream ranging as high as seven degrees above the farm stream (table 2).

Although both of these streams are only feeders to larger trout waters, their differences in temperature are indicative of those in larger farm and forest streams. This study reveals that shading is the key to control of

Table 2.—*Comparison of average monthly stream temperatures, forest and farm streams*

Season	Maximum			Minimum		
	Forest	Farm	Diff.[1]	Forest	Farm	Diff.[1]
Winter						
December	48.5	51.0	+ 2.5	43.8	43.5	—0.3
January	51.7	52.5	+ 0.8	45.7	42.8	—2.9
February	46.5	49.2	+ 2.7	38.0	36.7	—1.3
March	48.5	53.2	+ 4.7	41.2	38.2	—3.0
Spring						
April	55.8	63.0	+ 7.2	46.8	43.2	—3.6
May	56.8	69.8	+13.0	52.5	51.6	—0.9
Summer						
June	61.5	71.7	+10.2	55.0	57.2	+2.2
July	61.5	73.8	+12.3	57.3	59.5	+2.2
August	64.2	75.8	+11.6	61.0	63.0	+2.0
September	65.0	74.8	+ 9.8	59.7	61.8	+2.1
Fall						
October	59.0	65.1	+ 6.1	53.0	54.0	+1.0
November	53.2	57.3	+ 4.1	48.0	48.0	——

[1]Represents change caused by mountain agriculture.

Geoffrey E. Greene, the author of this article is employed by the United States Forest Service with headquarters at the Southeastern Forest Experiment Station, Asheville, North Carolina.

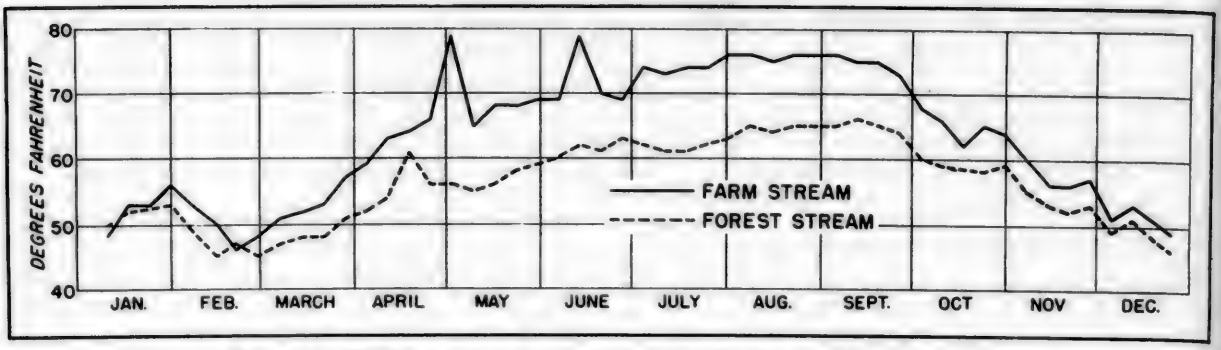


Figure 1.—Weekly maximum temperatures for the farm and forest stream.

stream temperatures, which is further emphasized by the fact that the farm stream dropped from 80 to 68 degrees after meandering through approximately 400 feet of forest and brush cover.

A study in the Smoky Mountains of Tennessee showed that upstream migration of brook trout was simultaneous with the removal of timber from the watershed. Trout streams are frequently in such delicate balance near the upper limit of tolerance that a slight increase in temperature would render them unfavorable to brook trout. An illustration of how this balance may be upset is a case in Pennsylvania in which the migration of trout was caused by excessive deer browsing of willows shading trout waters.

Because the absence of shade can exert such significant effects upon stream temperatures, it is evident that careful manipulation of riparian vegetation can be a means of maintaining optimum temperatures necessary for the growth and development of trout and the aquatic organisms upon which they feed.

Good watershed management includes not only the major streams supporting trout populations, but the tributary streams as well. Trout are known to obtain 80 to 99 percent of their food from aquatic organisms, which are believed to thrive more abundantly at higher temperatures. The most satisfactory practices would be those that raised the feeder stream temperatures to the maximum productivity of the aquatic organisms, yet did not increase the downstream temperatures above the limit of tolerance. Trout streams in the Southern Appalachians would lend themselves very well to such control by manipulation of the vegetation, because of the dense thickets of laurel and rhododendron growing along the stream channels.

The fact that stream temperatures can be greatly influenced by different land use practices provides added emphasis to the theme of leading conservationists that it is not possible to exploit one unit of a watershed without affecting another unit. In keeping with this line of reasoning the control of stream temperatures through watershed management should be given a more conspicuone place in land use programs.

Benefits of Range Land

(*Continued from page* 124)

It becomes readily apparent that a "rule of thumb" factor, such as was used to determine fixed and operating expenses (gross—40%), gives inequitable results. In Tables 6 and 7, forty percent of the rental returns from the excellent condition range is probably in excess of the necessary expenses, while on the poor and very poor ranges, the necessary costs probably would equal or exceed the rental returns. This means that the best range land is undercapitalized while the poorer ranges are overcapitalized. In actual practice, the amount necessary to reflect the fixed and operating costs will be varied according to needs. The remainder would then be available for capitalization and would give a true capitalized value.

Computing Conservation Benefits

The proposed method of computing conservation benefits from a range land program lends itself to many uses. It is a generally accepted financial principle to expect the value of most forms of loan collateral to decline during the period of loan. However, when agricultural land is offered as security for loans made for establishment of conservation, some financial institutions now recognize that the value of the collateral may increase during the period of the loan. The use of the proposed method of determining the returns from conservation practices can be used for loan justification purposes.

The soil conservationist, through its use, is able to inform the farm or ranch cooperator, with reasonable accuracy, how much he can afford to spend today to gain the desired results plus getting his investment returned at a predetermined future date.

BOOK REVIEWS

THE WESTERN RANGE LIVESTOCK INDUSTRY. *By* MARION CLAWSON. *McGraw-Hill Book Company. 1950, $5.00.*

Included in the early crop of 1950 books is a good one dealing with the business side of the range country. The new book entitled, "The Western Range Livestock Industry" was written by Marion Clawson, Director, Bureau of Land Management, Department of the Interior.

The range area discussed lies west of a line running south from the Red River Valley in North Dakota to Port Lavaca, Texas. While a great deal of the area is dry-farmed and irrigated, most of the land is either too dry, steep, high, salty, or shallow to farm. Such land is suited only for grazing.

The author, Marion Clawson, is a westerner, who has spent twenty years studying the economics of the range territory. He has drawn his material from personal experiences and also has selected over one hundred illustrations, charts and tables from the stock pile of information on range. This type of book has long been needed.

The business arithmetic of the range country is developed as never before. The climatic and physical resources are reviewed but major emphasis is placed on credit facilities, markets, livestock production, ranch organization and prices for livestock and livestock products.

The author says the book was written primarily for a college text but it should be extremely useful to anyone interested in the range and livestock industry.

—B. W. ALLRED, *Ft. Worth, Texas*

FARM WOOD CROPS. *By* JOHN FREDERICK PRESTON. *McGraw-Hill Book Company, 1949. 302 pp. with index. Figures 85. $3.75.*

"Farm Wood Crops" is a book that should be invaluable to everyone interested in farm woodland: Farmers, soil conservationists, foresters, and students of agriculture and forestry. John F. Preston is one of the few persons who has had an opportunity to view farm-forestry problems from many angles. In this book he relates knowledge acquired over a long and active life in forestry.

"Farm Wood Crops" is one of the few publications that treats farm woodland as an integrated part of the farm. The reader is bound to get the idea that trees are a crop, that it pays to farm woodland. The line between commercial and integrated forestry is clearly drawn. One is shown that it is possible to receive adequate returns from those areas of the farm that produce wood crops. The point is made that the greater portion of the farm income comes from the use of labor and equipment, and that this is just as true for the farm woodland as it is for the fields devoted to corn, cotton, and other crops. In the words of the author, "*Farm forestry is not a forestry job on farmland; it is a farm job on forest land.*"

The book is not intended to be a complete treatise on farm forestry but it does give all the information a farmer-owner needs to obtain greatest returns from his farm woods. It describes the tools needed and their use. One chapter is devoted to the kinds of assistance available from various agencies and explains clearly how a farmer may get such assistance and at what stage of his farm forestry program he should seek help.

The help that a farmer can obtain by requesting a complete plan from his soil conservation district is ably presented. The forestry phases of the farm conservation plan are clearly shown, as well as the meaning and use of the Land Use Capability Classification of farm land.

—A. L. PATRICK, *Upper Darby*

GRASSES AND LEGUMES FOR SOIL CONSERVATION IN THE PACIFIC NORTHWEST. *U.S.D.A. Miscellaneous Publication No. 678. By* A. L. HAFENRICHTER, LOWELL A. MULLEN, *and* ROBERT L. BROWN.

Everyone interested in grasses and legumes and their use in a sound soil and water conservation program for the Pacific Northwest will want to secure this excellent publication.

"Grasses and Legumes for Soil Conservation in the Pacific Northwest" is not just another bulletin describing the taxonomic differences of the various grasses and legumes adapted for that area. Rather, Dr. Hafenrichter and his staff of soil conservation plants men have organized the results of twelve years of observational and field testing work involving more than 7,000 individual accessions of grasses and 500 accessions of legumes in a most unique and usable manner. Each of the outstanding grasses and legumes was carefully evaluated for its particular uses, including erosion control, soil improvement, and quality and quantity of feed, whether for forage or hay.

Perhaps the most outstanding feature of this publication is that, for the first time, each plant accession is classified and placed into *use groups*. Each of the nine use groups dealing with grasses is separated into two parts, (1) grasses of primary importance and (2) grasses of secondary importance. The authors also list species

in each group that were tried but discarded. The tenth use group includes the new legumes.

This publication is based on very extensive plant observations and tests in the Pacific Northwest. This program was carried on by the Soil Conservation Service in cooperation with the Agriculture Experiment Stations in Oregon, Washington and Idaho, and the Bureau of Plant Industry. The work was done on the several SCS nurseries as well as on many farms in soil conservation districts under actual farming conditions. It reports results from range reseeding trials. The wide range of conditions made it possible to develop a map clearly defining the *zones* of *use* for each of the outstanding grasses and legumes in each use group. The only criticism which might be made is that the individual spot maps are a little too small to read easily.

The agricultural zone map of the Pacific Northwest on the inside of the cover sheet is excellent. A brief legend for each of the zones is clearly defined on the opposite page. Many references are made to this map throughout the text.

Choice and quality of photographs can hardly be equaled. Plant characteristics, including the above ground portion, roots, and seeds, are well illustrated. The field views add variety and further emphasize the actual utilization value of these improved materials.

The tremendous amount of factual material presented is clear-cut and to the point. The written material and tables are easy reading, which is a little unusual for a technical publication. The appended list of references includes twenty-four titles of important published literature pertinent to the subject of grass and legume sod crops and their use and management in soil and water conservation. The appendix contains an excellent table dealing with seed quality, including test weight per bushel, rate of seeding when the species are planted alone or in mixtures, and number of seeds per pound.

It is the opinion of the reviewer that this publication sets a new standard of clearness and usability in technical publications. The authors deserve high praise for the outstanding way in which they have presented their material. We need more publications like this one.

—WAYNE W. AUSTIN, *Berkeley, California*

TRANSACTIONS OF THE FOURTEENTH NORTH AMERICAN WILDLIFE CONFERENCE. *Wildlife Management Institute, Investment Building, Washington 5, D. C. 638 pp., Fig. 40, Tables 37, 1949. $2.50.*

The first North American Wildlife Conference was called by President Franklin D. Roosevelt in 1936. That conference and those which have annually succeeded it have contributed voluminously to conservation literature.

To the soil and water conservationist the gradual trend in recent years toward recognition of ecological principles in conservation—especially the relationships of people, soil water, and land use to the welfare of wildlife—is particularly notable. Members of the Soil Conservation Society will probably find the papers contained in Part 1—the General Sessions—of greater interest and significance than those of Part II (Technical Sessions). The administrators, industrialists, legislators, and educators, who contributed to the General Sessions, in general, have dealt with conservation from broad—and unusually thoughtful—viewpoints.

The following papers should prove especially interesting to the members of the Soil Conservation Society of America:

Senator Homer Ferguson's "Every Legislative Proposal Has its Pros and Cons," despite its title, is a statement we may hope reflects the general attitude of Congressmen. A surprising and interesting viewpoint stated by Senator Ferguson is that legislators, of necessity, actually represent to a certain extent special interests. He explains that not all special interests are evil. Conservation, for example, is one form of special interest. The legislator must guard against selfish special and individual interests.

In "What's Needed in National Water Conservation?: Engineering Developments," Morris L. Cooke, using engineers as an example, criticizes technical people who "look upon their professional status as vastly more important than their status as citizens." He attributes the characteristic to a failure in the education of professionals.

Kent Leavitt discusses soil conservation districts in relation to watershed stabilization in "What's Needed in National Water Conservation?: Watershed Management." He calls for coordination of conservation disciplines, and a "partnership shared by the individual and government, without any loss of integrity on either side."

The Honorable Clifford R. Hope also stresses a coordinated approach to conservation in "Essentials of a National Land-Use Policy." The establishment of a sound land-use policy, Hope states, is one of the most important domestic questions of today—and such policies are of world-wide significance.

Ecology in our society seems to be gaining some of the stature that physics, chemistry, and mathematics are now enjoying in human affairs. In "An Ecological View of Land-Use Policy," William Voigt discusses the ever-changing natural processes that must be understood in making conservation an effective policy.

The outstanding paper in the section of the Transactions dealing with education is, to this reviewer, Ruth Miriam Gilmore's, "Securing Cooperation Through Rural Education: Parents."

"Stream Pollution Program Under Public Law 845," is not a discourse on how streams may be polluted legally, but is merely an unfortunate selection of title. Dr. Leonard A. Scheele, Surgeon General, U. S. Public Health Service, gave an able presentation of how Public Law 845 operates to abate pollution.

Harrison F. Lewis' "Wildlife Values" differentiates "values" and "ethics." William Voigt, Jr., in "Can We Beat Back the Attack on Public Lands?," states that the attack by certain livestock interests on public lands *has* been beaten back—but that the Forest Service is being given 'the works.' The "vermin control" drum is beaten loudly in a pessimistic paper entitled "Going, Going, Gone," by Thomas H. Beck, who reflects the conservation viewpoints of a segment of sportsmen.

Explorer Vilhjalmur Stefansson, in his talk on "Economic Utilization of Wildlife Through Partial or Complete Domestication," seems to have been greatly amused at being compared in a favorable light with Dr. Cook by the person who introduced him. Dr. Cook's claims of discovery, as is well-known, proved spurious. Stefansson presented a case for the domestication of wild species, such as the musk-ox, particularly for areas of climatic extremes.

H. L. Mendall presents an interesting case of a reduction in waterfowl nesting sites brought about by fluctuation of water levels through industrial water use. His paper is, "Breeding Ground Improvement for Waterfowl in Maine." Alarming declines in fisheries resources are noted in "The Present Status of the United States Commercial Fisheries of the Great Lakes," by John Van Oosten.

Part I contains a total of 29 papers, the introductory remarks of Senator A. Willis Robertson, and the formal opening of the Conference by Ira N. Gabrielson, President of the Wildlife Management Institute.

The Wildlife Society was responsible for the organization of Part II. This part deals with the Technical Sessions, divided into sections covering "What's New in Game Management," "Fresh Water Resources," "Small Game Resources," "Salt Water Resources," "Big Game Resources," and "Wildlife Damage and Controls."

It is rather disappointing to note the few actual accomplishments in the development of optimum wildlife populations. It has become the fashion to conduct wildlife research in a piece-meal manner. The dynamic processes which culminate in a wildlife population receive little attention. Hopes for management appear to center on a synthetic system arrived at through a knowledge of how many bugs and berries the creature eats, its mating habits, where it spends its leisure, and other items in its hourly, daily and yearly life. Without minimizing the ultimate value of such information, it would appear that instead of starting a study with the end-product—the wildlife population and its habits—research might prove more profitable by ending there.

The Conference was summarized by Gustav A. Swanson, who noted, among other things, the emphasis on soil conservation districts as a vehicle for putting game management into effect on privately owned lands.

The reviewer finds the reproduction of photos in this and other volumes of the transactions disappointing. A well-reproduced illustration adds value to textual material—a poor one only occupies useful space.

—Philip F. Allan, *Fort Worth, Texas*

PROCEEDINGS OF THE INTER-AMERICAN CONFERENCE ON CONSERVATION OF RENEWABLE NATURAL RESOURCES, *Denver, Colorado, September* 7-20, 1948. (1949) *Department of State Publication* 3382, *International Organization and Conference Series II, American Republics* 4. *Division of Publications, Office of Public Affairs,* xi+782 *p. Superintendent of Documents, Government Printing Office, Washington* 25, *D. C.,* $2.25.

In this volume of the proceedings of the Denver Conference, we find an excellent record of the meetings and the first organized description of the resources of the Western Hemisphere presented in one hundred and eleven papers by various experts. The laudable aim of the Conference, as the Secretary General, William Vogt, puts it in his introduction, was to determine what were the correct questions which needed to be asked in order to get worthwhile answers—in this case, in terms of social action in the field of conservation. This emphasis on the need for renewable resource conservation through social action and the impact of non-conservation on the various American societies is readily apparent in the organization of the Conference into six sections—"*Human Populations and Productive Capacity of the Land*"; "*Renewable Resources and International Relations*"; "*Land Use and the Social Sciences*"; "*The Dynamics of Renewable Resources*"; "*Education in Conservation Dynamics*"; and "*Making Conservation Effective.*"

Nevertheless, there are several limitations to this volume, and they are basically the limitations of the conference of which it is the report. Thus, because the objective of the Conference was set to social action in the field of resource conservation, resource inventories take a secondary place and there are many regrettable gaps in the information presented. These gaps are all the more apparent because the specialization of many of the reports inherently prevents broad coverage. For example, the Brazilian papers deal with specialized problems rather than with the country's major regions as a whole, and this applies equally to the papers presented by Chile,

Venezuela, El Salvador, Uruguay, Colombia, Ecuador, Honduras, Peru, Puerto Rico, Argentina, Bolivia, Costa Rica and Guatemala. Only the resources of United States and Mexico can, in any sense, be considered as being adequately covered.

Thus, while it might be possible to extrapolate Mexican or American experience into the problems of other countries of this Hemisphere, and while many of the papers constitute the only readily available data on these specific problems, it must be said that their specialization limits the usefulness of the volume as a general reference work. This problem of specialization, which never arose to a major extent at the Conference due to the efforts of the discussion leaders, is very apparent because of the untrammeled latitude permitted the authors under the broadness of the six discussion headings. However, within the extremes—from a technical discussion of the "systematics of sociology" to a detailed description of a specific botanical garden—there are many worthy papers.

It will be interesting to contrast the future effectiveness of presentation and potential impact of the Denver Conference with those of the United Nations Scientific Conference on the Conservation and Utilization of Resources. For the first had as its aim the manner in which social action could best be utilized in resource conservation, while the second was an assessment of the world's resources and the techniques and researches that are currently being employed and the new developments that might be expected, without any proposals for action.

Twenty-seven action resolutions were voted by the Conference, which prefaced these with a Declaration of Principles. Among the latter, one might be singled out for special note: "*No generation is free to spend more than the interest yielded by rational use of the heritage.*" If such a proposition is accepted, less developed nations with limited capital resources are likely to remain undeveloped. Is it not rather important to recognize, in planning resource use to achieve the end of wise balanced use, that some of our natural resource capital must be spent in order to obtain the means to develop the rest. The rate and extent of this expenditure is the problem which confronts the general public and the expert.

A final note upon the value of these Proceedings as a reference work: It cannot be deplored too strongly that there is no index other than that of the authors. In these days when the complexity and variety of scientific work are already pressing so hard upon the researcher's limited time, it is most regrettable that the Proceedings of a Conference, united in a single approach, and whose papers are gathered in a single volume, should have been issued without an index.

—ROBERT G. SNIDER, *New York*

WESTERN LAND AND WATER USE. *By* MONT. H. SAUNDERSON; *University of Oklahoma Press. Norman, Oklahoma. 1950. 217 pages. $3.75.*

Mont Saunderson uses a vigorous brand of scientific vivisection on the west and gives the reader an inside look that contrasts drastically with the glamorous gloss which so often connotes cowboyland. Saunderson has given a plain spoken but scientific account of western problems as he sees them and understands them.

In the arid and semi-arid west, the major requirement for human survival is water. Indian and white man alike worship the "thunder-bird." More shooting has started over arguments about water rights or water holes than from all other causes, including heroines and gold.

Saunderson is an economist and an ecologist. The whole complicated composite of interlocking western interests has to mesh uniformly, he points out, or water interests are thrown out of line. He says that properly oriented conservation is needed to keep the multiple interests of grazing, irrigation, forestry, recreation, power development, flood control and silt detention correctly harmonized.

This book is loaded with a mass of facts about western resources which agricultural workers will want for reference purposes.

—B. W. ALLRED, *Fort Worth, Texas.*

The Foundations of Prosperity: *Program of the CIO Committee on Regional Development and Conservation. Published by the CIO, Department of Education and Research, 718 Jackson Place, N. W., Washington 6, D. C. 25 cents.*

This 32-page booklet should be known to all those interested in the use and development of our natural resources. Few conservation organizations have presented their position so positively, constructively, and succinctly as the CIO states its Conservation policy in this publication. The long-term view and breadth of approach are noteworthy, for attention is given not only to the regularly recognized natural resources, but to such features as scenery, historical and archeological remains, atomic energy, city decentralization, sun and wind power, and industrial planning. Also available are the previously published pamphlets on soil conservation, "*Healthy Soil—Healthy People*" and "*The Magnificent Columbia.*" All are obtainable at 15 cents each.

Making Paydirt Last. *Allis-Chalmers Tractor Division, Milwaukee 1, Wisconsin. 1950. 16 page Pamphlet. Free.*

"Making Paydirt Last" is a guidebook of practical soil conservation methods for the man with ten acres or ten hundred.

It explains six proved methods of soil conservation: 1. grassed waterways, 2. strip cropping, 3. contour

farming, 4. terracing, 5. using more sod, 6. maintaining soil fertility—actual step-by-step directions are described and illustrated with pictures and drawings.

For example, there are five major headings under "Contouring, a practical way to farm". Two-color photographs and sketches are used to explain the use of a hand level, tractor-hood level or engineer's level. Also illustrated are the foresight, backsight method of laying out a contour line.

Although the booklet outlines steps to be followed, farmers are encouraged to ask advice of local technicians who are experienced and have surveying equipment.

"Making Paydirt Last" also tells how to build a permanent pasture and how to manage woodland to make it pay.

The sixteen-page booklet is a summary of information based on field experience by the Soil Conservation Service and agricultural colleges.

Sun in the Sky. *By* WALTER C. O'KANE. *University of Oklahoma Press, Norman. 261 pages. $4.00.*

The Hopi Indians of Arizona represent a civilization that antidates the coming of the first white man to America. Walter O'Kane tells this story with clarity and exactness. He reveals their ingenious agriculture on the arid sands, the construction and furnishing of their houses, their dress and personal traits and above all their character.

Land use, water problems and other agricultural situations are a definite part of the book. The author tells how, through the centuries, the Hopi Indians built small terraces to utilize water from springs; also the important part sand plays in their agriculture. Conservationists will be interested in this book because of its historical value and the references to land use and water resources.

Forage Crops. *By* GILBERT H. AHLGREN. *McGraw-Hill Book Company. 1949. 418 pages. $5.00.*

This book covers all the important hay and silage crops, their cultivation and management, adaptation, uses in mixtures and seed production. Discussions are also presented on labor saving machinery, hay standards and grassland farming.

The many charts, drawings and photographs are excellent. Each section of the book is well organized and documented. It can well serve as a handbook for agricultural workers in all fields—conservation included.

Rebuilding Rural America. *By* EARLE HITCH, *Harper and Brothers, New York. 1950. 273 pages. $3.50.*

Here is a book that faces squarely the question of how the rural community in America can continue to exist in the light of current economic changes and population shifts. It tells how this problem is being vigorously remedied in many communities throughout the Nation and in Canada.

The book covers three phases—Town and Country Problems, The Approaches to Solutions, and General Influences on the Community Outlook. Each section is presented in a clear and forthright style. The main examples of community development are excellent. They point out the important part that conservation plays and how people in many communities have worked together to rebuild their land as a part of community development.

Hydrology. *By* DANIEL W. MEAD. *McGraw-Hill Book Company, New York. 1950. 728 pages. $7.50.*

Water shortages and floods reported in various sections of the country give importance to this book. It presents clearly and concisely the many elements that embrace the science of hydrology. Discussed in the book are subjects that include water, wind and storms, geology, ground waters, droughts, rainfall, stream flow or runoff, flood and flood flows, and the application of hydrology.

Conservation engineers and others working with water will find this book valuable. It is well illustrated with many very fine charts, graphs and photographs.

The Fisherman's Encyclopedia. *Edited by* IRA GABRIELSON *and* FRANCESCA LA MONTE. *Published by Stackpole and Heck, Inc., Harrisburg, Penna. 1950. 698 pages. $12.50.*

More than 60 prominent sportsmen, ichthyologists, directors of state game and fish agencies, federal authorities on aquatic resources, and others combined their efforts to produce this authoritative book on sport fishing. It contains 28 major divisions and covers both fresh and salt water game fish, fish management, where to fish, when and how to fish, and many other topics of interest to the outdoorsman.

The book is profusely illustrated with excellent drawings, charts and photographs to emphasize points that authors wish to make. Sixteen full color plates of game fishes of North America and well known flies, streamers and other baits used by fishermen are also a part of this outstanding book.

The Fisherman's Encyclopedia should be in the library of all fishermen and others interested in the conversation and development of our natural resources.

"Grassland farming offers stability to our agriculture; it offers better nutrition to the entire nation. Grassland agriculture means balanced agriculture."

—P. V. CARDON,
Agricultural Research Administration

Recent Research Reviews

JAMES H. STALLINGS

Grazing Studies On The Amarillo Conservation Experiment Station 1943-49. *By* CHARLES J. WHITFIELD, JOHN H. JONES *and* JOHN P. BAKER; *Texas Agr. Exp. Sta. Bul. 717. December 1949.*

This bulletin gives a summary of the grazing studies made on the Amarillo Conservation Experiment Station from 1943 through 1949. Investigations have been made of the grazing values of: (1) native blue grama-buffalograss pasturage; (2) seeded cool-season grasses, such as crested wheatgrass and western wheatgrass; and (3) temporary pasture crops, such as Sudan grass and winter wheat. Tables show the gains made from these various types of pasturage.

Forage production and the chemical composition during different seasons of the year for the important plants studied are also presented. With favorable rainfall, a well balanced, year-round, green grazing program for this section of the Southern Great Plains may be had from a combination of the following pasturage; winter—winter wheat, crested wheatgrass and western wheatgrass; spring—crested wheatgrass, western wheatgrass, little barley and early weeds; summer—blue grama, buffalograss, Sudan grass and lake weeds; and fall—crested wheatgrass, western wheatgrass and winter wheat.

Classification of Land According to its Capability as a Basis for a Soil Conservation Program. *By* ROY D. HOCKENSMITH; *Proc. of the Inter-American Conference on Conservation of Renewable Natural Resources, Denver, Colorado, September 7-20, 1948, pp. 450-465, USDA—SCS, Washington, D. C. December 1949.*

The landcapability classification is a systematic arrangement of different kinds of land according to those properties that determine the ability of the land to produce permanently. Suitability for cultivation is assumed to include the use of machinery — at least of plows, tillage implements, and harvesting equipment—and capacity for a significant yield of one or more crops with suitable treatment and protective measures. The degree of permanent limitation imposed by natural land characteristics necessarily affects; (a) the number and complexity of the corrective practices; (b) the productivity; and (c) the intensity and manner of land use—for example, the choice of crops on cropland or the amount and season of use on grazing land.

The classification is made and used for a practical purpose, which is the selection and application of land uses and treatments that will (a) use the land, and (b) keep it in condition for long-time production. The latter involves erosion control and other maintenance.

More Fish And Game. *By* VERNE E. DAVISON; *Better Crops with Plant Food, Vol. 34, No. 1, pp. 23-25 and 45-46. January 1950.*

Anyone who owns land can improve it; can make it produce more game or fish or both. The right to good hunting and good fishing must be earned by dependable effort to produce the game and fish we seek. The productivity of land and waters for wildlife can be increased by choosing the plants desired and excluding the useless ones. It is being done with farm ponds for fish, with bicolor lespedeza for quail, with multiflora rose for rabbits, and in a general way for several kinds of wild creatures by the land-use improvements inherent with application of the best soil and water conservation measures. The use of fertilizer, soil culture and the right kinds of soil and water conservation measures is essential in overcoming the common deficiencies of natural climate, plant growth and soil.

Failures come from two major causes: First, unsound site selection—too much water or silt or both in ponds; land too wet or subject to grazing in the case of bicolor plantings. Second, failure to fertilize the clear waters of ponds sufficiently; and failure to feed bicolor with the phosphate and potash which a vigorous growth requires to produce a heavy crop of seed.

A Practical Soil Moisture Meter as a Scientific Guide to Irrigation Practices. *By G. J. Bouyoucos; Agron. Jour., Vol. 42, No. 2, pp. 104-107. February 1950.*

The author presents a simple, quick, and practical method of measuring the available moisture content of soils. This method indicates when and how much it is necessary to irrigate, and how deep the applied water has penetrated the soil. It can be used as a guide to irrigation practice and thus enables the farmer to irrigate more scientifically and intelligently.

The method consists of an alternating current impedance meter and a plaster of paris block with two electrodes imbedded inside. The method is called the plas-

(*Continued on page* 139)

The Reviews by J. H. Stallings that follow are a regular feature in the JOURNAL. It is hoped that the projects reviewed from time to time will be helpful to conservationists everywhere. Members of the Society are urged to indicate their interest in the kind of research work that should be reviewed.

FIELD NOTES AND COMMENTS

Dahurian Buckthorn—A New Shrub for Conservation Plantings

Field shelterbelt, farmstead windbreak and wildlife cover plantings are still on the increase, both in scope and popularity, in the Great Plains area. Conservationists are continually seeking new trees and shrubs that will improve the effectiveness of these conservation plantings.

One, Dahurian buckthorn, *R. dahurica Pall.*, is showing excellent possibilities. At the Mandan, North Dakota, Soil Conservation Service nursery it is being grown with less difficulty than any of the other shrubs, which include caragana, honeysuckle, lilac, plum, chokecherry, buffaloberry, golden currant, and Nankin cherry.

This species is also free of insects and disease. The common, or European, buckthorn is used extensively for hedge plantings, but its use for conservation plantings is not recommended since it is an alternate host for oat rust *Pucciana coronata.* Dahurian buckthorn, however, is virtually immune to this rust.

Its prolific seed production makes it desirable for a wildlife food plant. The brownish-black fruits mature along in September and hang on into the winter months. They are oblong in shape, each contains one or two seeds, and are borne on the sides and tips of the stout branches. A pound of clean seed contains about 25,000 seeds.

Member of a family of about 100 species found native in the Northern Hemisphere, Dahurian buckthorn

Of Course You're Coming!

Detroit, October 26, 27, 28—Annual Meeting—Soil Conservation Society of America.

Plan now to attend the Soil Conservation Society Annual Meeting in Detroit, October 26, 27, 28. What's more, if you love your wife, bring her, too. See how the "Arsenal of Democracy" is now making peacetime production records. Your annual meeting committees are planning an outstanding program, both for the men and for the women. You will have an opportunity to "rub elbows" with some of the biggest production men in the world and to hear of their interest in Agriculture.

You owe it to yourself, to your Society, and to your profession to be in Detroit, October 26, 27, and 28.

Photos by A. E. Ferber

Figure 1, *Left.* A Dahurian buckthorn thicket shows the density of a shrub row in a windbreak. It is native to northern China and adjacent areas and grows to a large, spreading shrub or small tree. *Right.* Dahurian buckthorn is considered desirable as a wildlife food plant because it is a prolific seed producer. The brownish-black fruits mature in September and hang onto the plant into the winter months. This picture shows a Dahurian buckthorn in winter. Note the large number of fruits still clinging to the branches.

was introduced from Asia. It is a species native to North China and adjacent areas. It grows to a large, spreading shrub or small tree. Foliage is handsome.

It was observed in tests with fairly satisfactory results in field plantings by several agencies in the late 1930's. The SCS nursery at Mandan conducted similar observations and in 1940 began more extensive plantings. The original lot of seed came from the Northern Great Plains Field Station at Mandan. Today, more than a half-million plants are in soil conservation district plantings.

With reasonable care in pre-seeding treatment and planting, a good nursery emergence is usually obtained. Two years are required to produce sizable seedlings, 18 to 24 inches in height, but this can be accomplished in one year in more favorable locations. Dahurian buckthorn has been seen to bear fruit the second year in the nursery. No dusting or spraying is needed to combat pests and disease.

Plants should not be lifted in the nursery until complete hardening has taken place, usually in the late fall months. Seedling bundles should be small and extreme care must be exercised in heeling-in, since there is some evidence of heel-in bed losses when heeling-in is done improperly.

Results from field plantings indicate a favorable rate, averaging about 12 inches per season, freedom from insect ravages, good percentage of survival, and complete hardiness to drouth and cold. It prefers the better soils, however, and other shrubs may do better on poor, sandy sites. The wood is somewhat brittle and some snow breakage may occur with heavy snows.

Considering both good and bad features, it is likely that this shrub will take its place alongside the better known species, such as caragana, honeysuckle, lilac, and chokecherry, in future plantings in the Northern Great Plains areas.

—A. E. FERBER, *Mandan, North Dakota*

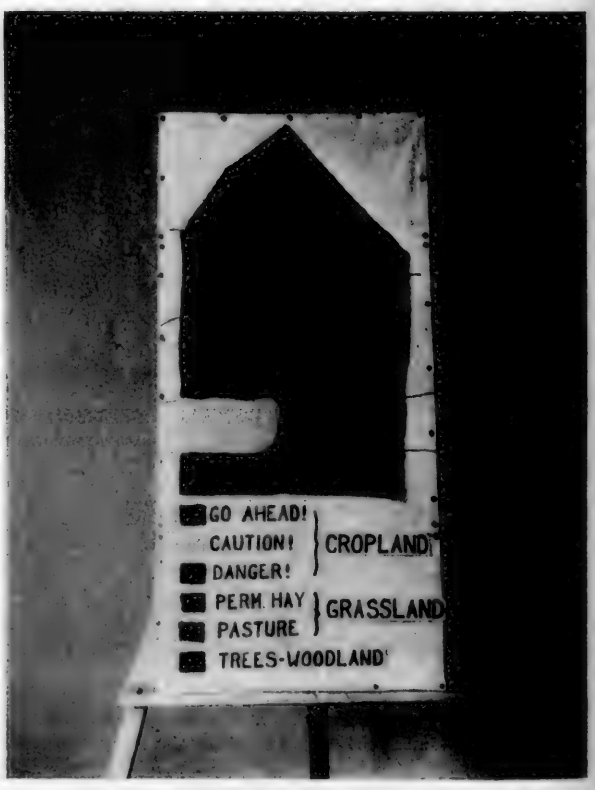
Flannel Graph Used to Explain Land Use Capability Classes

Sometime ago I devised a simple flannel graph to help explain land use capability classes and the soil, slope and erosion information on which they are based. It is an effective tool and very easy to make. The description of the flannel graph, the method of use and how to make it follows:

A piece of white outing flannel of any convenient size is used as a working surface. This is mounted on plywood which can be in one piece or hinged to fold to convenient size. The outline of a farm and soil, slope, and erosion guide lines are stitched on the white flannel. (My wife did this on her machine using black thread on the bobbin and white thread in the needle and using six stitches per inch.) This outline is for the operator only. The black thread shows up as a series of small dots which are not visible to the audience.

As the first step in use, the soil, slope, and erosion guide lines are "traced" over with black embroidery floss. Then the soil, slope, and erosion symbols are placed in each separated area on the base flannel. (My wife also made the symbols, using stencils and textile paint to make letters and numbers 1½ inches high. A pair of pinking shears came in handy to pink the edges of all flannel pieces.) The first two symbols were made up of three parts and each part was explained separately as they were put up. After two of them have been explained separately, the remaining complete symbols go on.

As the Conservation Survey Map is being built on the flannel, an explanation is given on how the soil scientist works; how he gets his information and assembles it on aerial photographs. It has added interest to show an actual conservation sheet, soil auger, and Abney level to help in creating a mental picture of the soil scientist and the importance of the basic information he gathers and records.



A flannel graph is easy to make.

After the conservation survey information is recorded on the flannel, it is explained that these soil, slope, and erosion factors are studied to determine the most intensive safe use for each combination. It is further explained that similar combinations are grouped to simplify the information; that land is carefully classified according to the groupings; and that a simple way of describing these land use capability classes is by means of colors.

The lecturer then goes on to change the conservation survey map to a land use capability map. This is done by having pieces of flannel colored and cut to fit each outlined section on the background flannel. (Here again my wife contributed by dying, cutting, and pinking the flannel.) As each colored section is placed over the conservation survey information, an explanation is given as to what each color means as a capability class.

When the filling-in of the colored sections is completed, a quick review of the whole capability map is made, using a legend set up on a section of unused flannel below the completed map. Small blocks of flannel of each land class color are used and a short printed description of each land class is placed opposite each color block. (Legends were made by inking 1½ inch letters on bond paper and then stitching the paper to flannel strips.) When the flannel graph is completed, local LUC maps may be passed around.

To further carry out the idea of local application of LUC's a series of Kodachrome slides are used to show what the different land classes look like and how they should be used for permanent, productive use. As an introduction to each class of land to be illustrated, a Kodachrome of each land class as it appeared on the flannel graph is shown. (These were prepared by photographing the flannel graph with each land class color separately in place.)

For convenience, a folding tripod easel was built to accomodate the flannel graph, since it must be used at a slightly reclining angle in order for the flannel to stick properly.

The flannel graph has been used before eleven different groups of nearly 400 farm and non-farm people. It served a useful purpose at a variety of meetings to help tie the particular meeting theme to proper land use as it was needed locally. From the interest shown and questions asked, it is safe to say that a flannel graph can be used as an effective visual tool to help explain land use capabilities. It is particularly helpful in explaining the scientific information on which LUC's are based.

—Ross H. MELLINGER, *Elizabeth, W. Va.*

Grassland Management Is Profitable

Properly managed pastures afford profits that compare favorably with profits from cropland. In addition to its importance in preventing erosion, green pasture is three to five times cheaper than any other type of livestock forage.

The vigor and duration as well as production of grassland depend upon correct cropping of the grass itself. Enough leaves must remain to manufacture food all during the growing season. The leaves act as manufacturing plants by taking the raw materials from the soil and air and making them available for plant growth. A good rule to follow is to leave one-half the surface growth of the plant, measured by weight, not height. The left-over grass is not wasted. When it settles on the ground, it provides an effective shield against cutting the force of falling rain. It also shades and cools the ground and cuts down evaporation. Finally it disintegrates into humus and becomes a part of the top soil, giving tilth and providing food to teeming millions of soil organisms that promote ideal growing and feeding conditions for grass roots.

Overgrazed pastures have a good chance of being killed under drouthy conditions. Results from one experiment on buffalograss pasture show that when properly grazed, its roots would penetrate in abundance to a depth of five feet. When overgrazed, its roots were few in number and only penetrated to a depth of two feet.

When any grass is overgrazed, its roots feed shallow and the number of roots are reduced, making the plant more susceptible to adverse conditions.

—B. W. ALLRED, *Fort Worth, Texas*

Permanent Wilting Percentages of Glacial Soils in the Northeast

Opportunities to determine under field conditions the permanent wilting percentages of the finer textured soils in the Northeast are few. Rainfall is in general so high and so well distributed throughout the year that only infrequently does the soil-moisture supply fall this low.

Permanent wilting percentage has been defined as the state at which the leaves first undergo a permanent reduction of their moisture content because of a deficiency of soil moisture. This means a condition from which the leaves do not recover in an approximately saturated atmosphere without the addition of water to the soil.

An opportunity presented itself during the summer of 1949 to determine some permanent wilting percentages from soil-moisture data taken as part of a flood-control

survey in the Upper Susquehanna River watershed in southern New York State. Little or no rain had fallen for weeks. The vegetation showed varying stages of wilting. The grass and shrub growth evidenced the most severe wilting; the deeper-rooted trees appeared less affected.

A limited number of soil-core samples were collected under several land-use conditions in Steuben and Chemung Counties. In all places the appearance of the vegetation indicated that the soil in which the plant roots were growing was at the permanent wilting percentage. This condition could not be verified in the field, but it is believed that the soil-moisture values were near enough to the permanent wilting percentage to indicate minimum contents.

It was thought that these data might be useful to workers engaged in watershed management. The permanent wilting percentages indicate approximately the lower limit of soil moisture to be found under field conditions. When used in conjunction with field capacities and saturation capacities these figures would be useful in computing soil moisture storage. The volume of water that can be taken up by a soil and held permanently from stream flow is determined by subtracting the p.w.p. from the field capacity. This is the amount of water generally considered available for plant use. The maximum amount of water that the soil can hold temporarily is determined by subtracting the p.w.p. of a soil from its saturation capacity.

The soil samples used in these determinations were taken in 100-cc. and 250-cc. cylinders three inches in diameter. To determine the field moisture content the fresh soil samples were weighed and the moisture was driven off by heating them in an oven at 105° C until a constant weight of soil was obtained. The moisture loss, expressed as a percentage of the soil sample in both weight and volume, is the permanent wilting percentage.

Table 1.—Moisture content at permanent wilting percentages, Upper Susquehanna watershed.

Cover	Complex Soil horizon[1]	Samples	Moisture content at p.w.p. By vol.	By wt.
		Number	*Percent*	*Percent*
Forest	Mor humus	15	7.4	37.5
Forest	Mull humus	12	13.8	19.3
Agricultural land restocking to trees / Agricultural land	Plow layer 0-3" depth	36	10.9	9.6
Agricultural land	B horizon 10-14" depth	28	9.3	6.4
Agricultural land	C horizon 20-22" depth	9	12.5	9.0

[1]Soil textures were silt loams, mostly gravelly or stony. Samples were identified by soil series in the field, but since few samples fell in any one series they were combined.

The fact that the permanent wilting percentages of some of the soil samples were lower than figures usually given for soils of these textures is probably due to the high gravel and stone content of the soils sampled.

The permanent wilting percentages by horizons for the complexes sampled are given in table 1.

Because of the differences in physical characteristics within a soil type, the values for individual soil types, determined as they were on a limited number of samples, would be subject to question. On the other hand, the average values for the group are probably broadly applicable to most of the gravelly and stony soils of the Upper Susquehanna watershed.

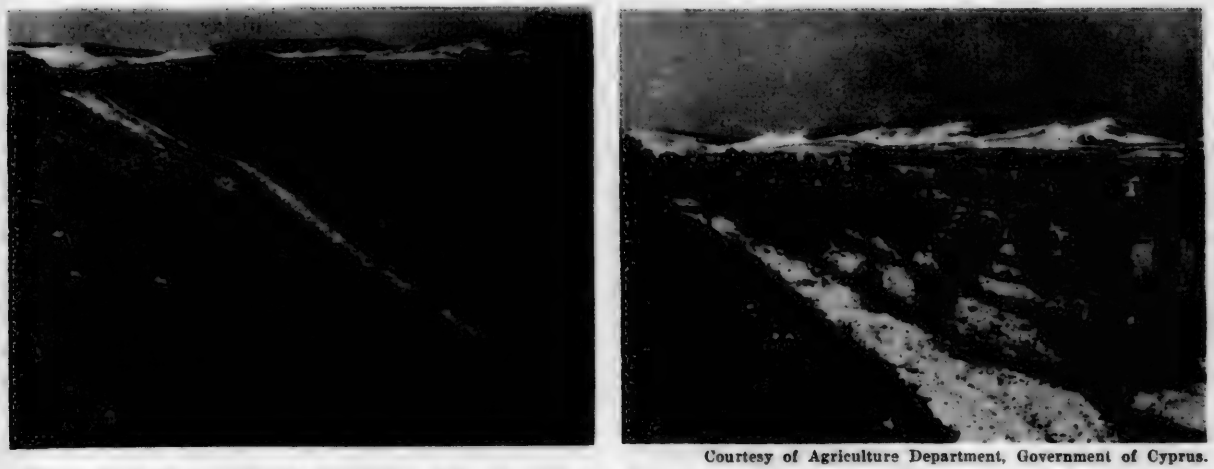
—CHARLES E. HALE, *and* G. R. TRIMBLE, JR.
Foresters, Pacific Northwest Forest and Range Experiment Station and Northeastern Forest Experiment Station, respectively, U. S. Forest Service.

Delegates From Twelve Countries Study Conservation in Cyprus

Twenty-one delegates from twelve countries of the Near East and Mediterranean region took part in a study of soil and water conservation on farms and in the forests of Cyprus during the period from April 16 to May 6, 1950, as the result of arrangements made by the Food and Agriculture Organization of the United Nations with the Government of Cyprus. The meetings gave the delegates an opportunity to determine to what extent the work now being done in Cyprus is applicable to conditions in their respective countries in all or parts of which winter rains and hot rainless summer prevail. The meeting, divided in two parts, consisted of field work with one day of formal session in Nicosia, the capital of Cyprus, at the end of each ten day period.

The chief conservation works which interested the visitors are:

1. Experimental farms, nurseries, stone bench terracing in vineyards, contour ridging arable land and planting olive and carob trees on the contour. Experiments have proven that crop yields can be profitably increased by substituting annual legumes that are grazed off instead of bare fallow in rotation with cereals. With such an increase in forage, livestock is much more productive and profitable, also the protection of forests and village fuel areas from destructive grazing is greatly facilitated.



Courtesy of Agriculture Department, Government of Cyprus.

Figure 1—*Left,* Contour ridges constructed for planting this barren hillside at Arodippou near Larnaca. *Right,* View of same area ten years later. The ridges were planted with grasses principally *Oryzopsis miliacea* and *stipa pennata.* Acacia was planted on the steep hillside. Carobs and olives were planted on the lower ground and eucalyptus along the highway. Cereals are planted in alternate years between the trees.

2. Improved breeds of cattle, sheep, goats, hogs, poultry, horses and donkeys, pasture and forage production and silage making.

3. Forests without any livestock, formerly stripped bare by goats, but now being regenerated by natural means, artificial seeding and gradoni or contour trenches; sand dune fixation; fuel areas established by about one-fifth of all villages; transfer of people who formerly kept goats from the forest to agricultural land, and wild life protection including moufflon (Ovis ophion). By taking advantage of the State goats law, nearly half of the 627 villages have voted to ban free ranging goats and require all goats kept for milk to be tethered or penned on village lands.

4. Irrigation schemes, including diversion dams, reservoirs, the levelling and diking of fields, the development of small springs and pumping from deep wells and infiltration tunnels.

Such work, coupled with phenomenal success recently in ridding the island of malaria, has added greatly to the well-being of the people. In consequence, the delegates agreed to recommend acceptance of the invitation of the Government of Cyprus to the irrespective governments to send students to learn the value of such practices and how they are being applied in Cyprus.

It was also agreed by the delegates than an urgent need existed for a coordinated program of research and other soil and water conserving operations in the Near East and Mediterranean region with particular emphasis on the grazing lands, and that FAO should take the lead in such work, including the exchange of technical information and personnel.

Cyprus Intensively Used

Cyprus, an island of 3,584 square miles in the Mediterranean off the south coast of Turkey, has a population, chiefly agricultural, of about 450,000 people or an average of 126 people per square mile. The typical farmer of Cyprus lives in a compact village and owns 20-25 acres of land, which is divided into several unfenced fields scattered over the village area. There are about 60,000 farm operators. The winter rainfall, extending from about November to May, varies from 10-12 inches in the central plains between two parallel east and west mountain ranges and along the north and south coasts, to 30-40 inches in the mountains, the highest of which reach over 6,000 feet. The crops are principally wheat, barley, oats, vetches, broad beans, potatoes, olives, carobs, almonds, figs, oranges and grapes. The livestock are principally sheep and goats with a considerable number of donkeys, some horses, hogs, cattle and poultry.

About 18 percent of the area is in state forests which consist of Aleppo and Troodos pine, native cedar, cypress, plane and alder, from which all domestic animals have recently been excluded, with provision for a limited number of sheep and large animals when stands and soil cover are adequately established. About 33 percent is poor, unfenced, and unregulated grazing land, mostly foothills, with a sparse stand of annual grasses, weeds and small bushes. Of the cultivated land, about nine percent is flood irrigated and only 3½ percent has water throughout the summer.

Shortage of winter and early spring rains occasionally results in severely reduced crops. There are practically

Courtesy of Forest Department, Government of Cyprus

Figure 2—The principal pine of Cyprus, (Pinus halepensis var. brutia) in Paphos forest. Formerly it suffered severely from tapping for turpentine, fires and goats. Now it is well-protected and thriving.

no green summer pastures. Consequently, the dairy animals, principally sheep and goats, have very low milk yields. Furthermore, the badly overstocked and very sparsely covered grazing land loses huge quantities of soil which clogs riverbeds and fills irrigation reservoirs and ditches during the torrential rains.

Cyprus, in common with most parts of the Near East, has been intensively used at various periods for field, tree and vine crops, livestock and forest products for as many as six milleniums. Assyrians, Persians and Egyptians were among the ancient rulers. Mountains, now forested or wholly denuded, were covered with vineyards in Roman times. Salamis, a Roman city with marble temples, is now buried under as much as 20 feet of dune sand. Even in the nearly level plains of Mesaoria, a considerable part of the land either is abandoned or is producing only very meagre crops, because most of the soil has been washed away during centuries of cultivation and the parent rock is exposed. Much is being done and much more can be done to good advantage to heal such wounds and increase production.

—A. T. SEMPLE, *Washington, D. C.*

Land and Soil Conservation Judging Contest at Missouri State College

The Southwest Missouri State College at Springfield, Missouri held its first annual Land and Soil Conservation judging contest for the Future Farmers of America in its 22 county area on April 14, 1950. The contest attracted 38 judging teams from 62 vocational agriculture schools in the area, a fine showing for a brand new contest.

Points scored by the teams in land judging counted toward each school's grand total for sweepstakes prizes having equal weight right along with dairy, livestock, grain, poultry and all the other regular contests. It was so popular with the boys and their instructors that there is no doubt it will be held annually, according to Dr. Glen Karls, Head of the Agriculture Department and W. W. Hoy, Professor of Soils at the College.

The boys were asked to decide on two principal factors: (1) *the physical characteristics of the land itself* and (2) *the use and treatment they would recommend for assuring its permanent productivity.*

To make this possible a score card was prepared by Harold Grogger, State Soil Scientist, U. S. Soil Conservation Service located at Columbia, Missouri. The score card gave each contestant the opportunity to select the correct description of the field being judged by observing the slope, depth of topsoil, color, effective depth and other physical features that could be seen. A hole had been dug through the soil profile to make it easier to see certain features.

—ALBERT B. FOSTER, *Milwaukee, Wisconsin*

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The vigor and constancy with which the NITRAGIN Company promotes the value of legumes, and the importance of their inoculation, does much to further soil conservation and better farming practice. The NITRAGIN laboratories are the largest and most complete in America devoted exclusively to the production and testing of legume bacteria. If you have an inoculation problem or are conducting experiments that require special bacterial strains, write us about your work. We will be pleased to cooperate with you.

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Research Reviews

(*Continued from page* 132)

ter of paris electrical resistance method. It measures soil moisture electrically in a matter of seconds.

Conservation Methods in Cotton Production. *By B. H. Hendrickson; USDA, Misc. Pub. No. 694. October 1949.*

The conservation of their cropland is the most important and difficult land problem of Cotton Belt farmers. Practical farming methods which reduce both soil and water losses while improving the productivity of the erosion-damaged soil are required.

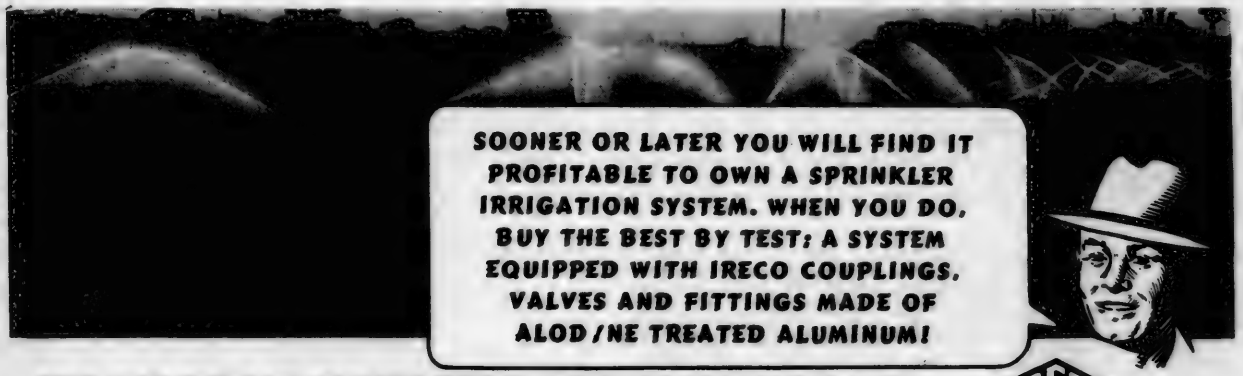
Frequent high-intensity rainstorms and the resultant damage caused by splash of raindrops and wash of run-off waters on row-cropped farm land account for the major portion of the erosion. Such storms occur most often during the main cotton growing season at a time when the land is particularly vulnerable to the ravages of these erosive agents.

At this season cotton land is exposed to the direct impact of falling raindrops and is heavily damaged by raindrop splash. The soil-dispersing action of raindrop impact also causes puddling, pore-clogging, and sealing of the soil surface. Thus, infiltration of rain water into the soil is lessened and run-off and erosion are increased. The most effectivce way to prevent the damaging effect of rainfall is to keep the raindrops from striking the soil surface.

This can be accomplished by keeping the surface of the ground adequately protected by vegetal cover through the use of cover crops, crop residues, and mulches as well as by forcing rapid growth of the cotton crop. Terraces and other contour operations may be needed to get runoff water safely across sloping cropland.

The Effect of Tillage Method on Soil and Moisture Conservation in the Plains Area of Northern Montana. *By T. S. Aasheim; Mont. Agr. Exp. Sta., Bul. 468. December 1949.*

This bulletin is a summary of the results obtained through studies on tillage methods and methods of handling crop residues which were started near Froid in 1940 and near Havre in 1941. Methods and equipment used most satisfactorily in carrying out a system of stubble mulch summer fallow are discussed.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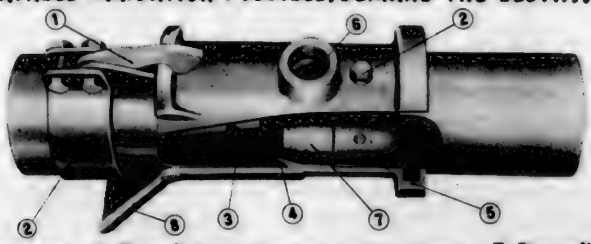

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Thank you for your letter of June 22 commenting on the recent John Deere advertisement in the JOURNAL.

I thought you might be interested in the story back of it. We ran this a originally two years ago and had many requests for reprint copies, chiefly from the Soil Conservation Service. Accordingly, we reprinted it several times—perhaps 50,000 copies—which were distributed mainly through SCS regional information men. We just this week ran another 15,000 to take care of current requests. We have lost all track of the total, but it is somewhere between 65,000 and 100,000.

—F. E. CHARLES, *Deere & Co., Moline, Illinois*

The advertisement referred to in this letter addressed to T. S. Buie of Spartanburg, South Carolina, appeared in the April 1950 issue of the JOURNAL. *It was entitled "An Easy Lesson in Hard Facts."*—EDITOR

Charter Member Becomes Contributor

As a charter member of the Soil Conservation Society of America I have enjoyed the JOURNAL very much and want to compliment you on the high quality of the subject matter which you have been printing.

To date I have never contributed to the JOURNAL but I have always been most interested in the two sections—Recent Research Reviews and Book Reviews. A most outstanding bulletin on *"Grasses and Legumes for Soil Conservation in the Pacific Northwest"* was recently published by Dr. A. L. Hafenrichter and others. I have written a review of this publication and hope that you will be able to publish it in your Book Review section. The importance of grasses and legumes in a sound soil and water conservation program makes the material most timely at this time.

—WAYNE W. AUSTIN, *Berkley, California*

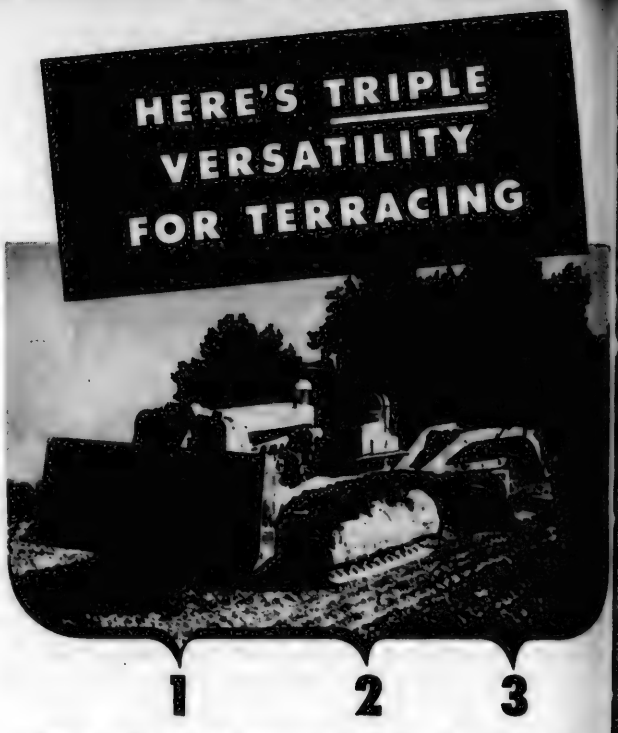
The book review mentioned in Mr. Austin's letter appears on page 127. EDITOR.

Observations From Scotland Are Timely

In returning the enclosed Ballot Paper I should like to express my sincere regret that I have found it necessary to discontinue membership. I am a small independent cultivator hampered by financial restrictions, and can only subscribe to a fraction of the numerous publications on soil conservation and allied matters. . . .

I need hardly say that articles in the JOURNAL have been studied with the keenest interest. There is, however, one observation I should like to make. While opinions differ as to the value of power-driven machinery in agriculture there seems to be general agreement that where the machine has destroyed it can be used to rebuild. Naturally this view is prevelant in those countries where mechanization has been carried furthest, thus tending to obscure the equally potent advantages of the plant world, particularly grass. Since reading the article by Munns and Lassen, VOLUME 5, NUMBER 2, I feel I must suggest that perhaps an article dealing with the work of R. H. Elliot, the Scottish pioneer of the deep-rooted grass would not to be out of place. His book *"The Clifton Park System of Farming"* would be drawn on together with the practical field extensions of the well-known organic farmers such as Friend Sykes, Nawman, Turner and others.

—ROY BRIDGER, *Scotland*



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The improved No. 2 Preco Terracer is rugged equipment, built for years of service. Welded box frame, easy, smooth blade adjustments. Full enclosed gears, dust-proof bearings. Let us send you full information on this effective combination for your conservation work.

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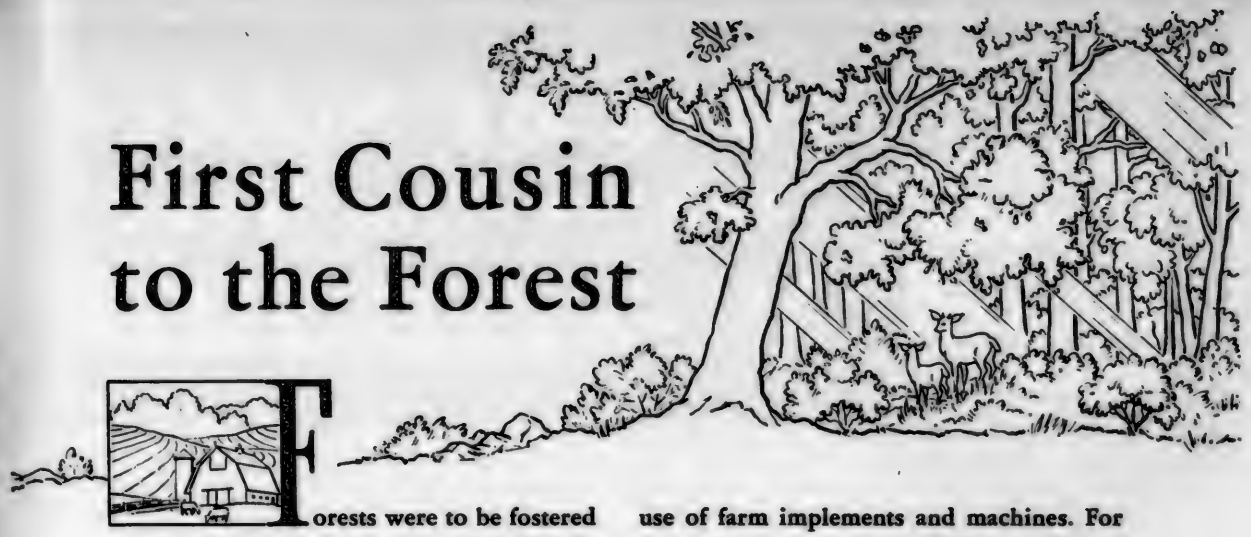

Forests were to be fostered for their own sake, as sources of timber, in the dawning idea of conservation. Soon came consciousness of the forest role in control and conservation of water. Later was learned the power of trees in the toughest tasks of soil erosion and silt control.

Now we see that conservation comes not in closed compartments, but as a unified program of land utilization. Valley and hill, forest and field, wild life and farm livestock —all are parts of the intricate, interlocking pattern.

Farming methods play the dominant role in the agricultural aspects of conservation. Adoption and success of proper farming methods depend on availability and proper use of farm implements and machines. For more than a century, providing ever-better farm machinery has been the business of the J. I. Case Co. And increasingly, for many years, Case has carried on educational work to inspire farming methods that conserve soil and water as well as human time and toil.

As materiel for conservation methods, farm machinery is kin to the forest. As a contribution to closer kinship between leaders in forestry and agriculture, Case invites you to see . . . and to use, as you can . . . the Case educational materials. They cover all the accepted soil and water conservation practices from ponds to pastures . . . grassland farming and forage feeds . . . improvement of farm fertility and farm earnings.

There are movies in full color and sound . . . bulletin-style booklets . . . wall hangers and charts. All are listed in a little catalog, "Case Visual Education Materials." We'd like to send you a copy. Address J. I. Case Co., Educational Division, Racine, Wis.

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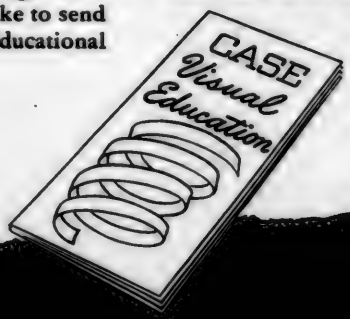

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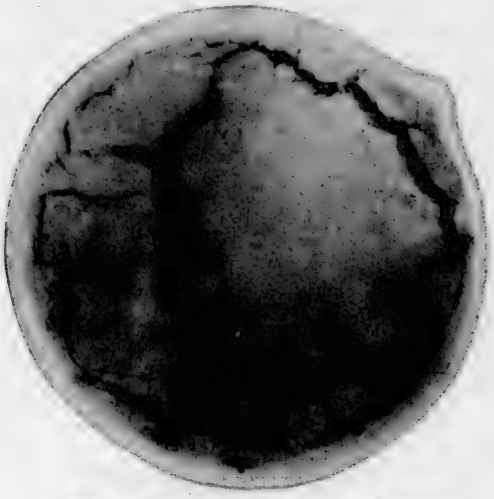
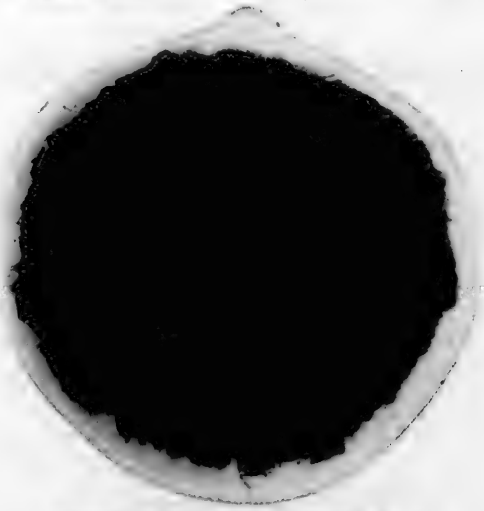
WHAT *Organic Matter* DOES FOR THE SOIL



Showing the deterioration that results when the organic matter is burned out, or farmed out of the soil. In wet seasons the soil becomes water-logged and sticky. In dry seasons, it cakes and cracks. This sample was taken from the middle of a cultivated field where the organic matter content was calculated at 49 tons per acre. Compare with picture below.



Showing the good crumb structure that results when the organic matter of soil is well maintained. This Brookston clay loam is of the same soil type as shown in the upper view. Taken from a fence row adjoining the same field, its organic matter content was calculated at the rate of 106 tons per acre.*

*Examples are from published experiment station data.

Organic matter gives the soil motive power. Organic matter functions somewhat as steam, gasoline, or electricity in furnishing power. Without organic matter, a soil is dead. As organic matter approaches exhaustion in a soil, that soil fails to function. Continuous cropping — without adding barnyard manure, or turning under crop residues, or plowing down green manures — is almost certain to deplete a soil.

The Ohio Experiment Station showed that continuous cropping to corn and cereals depleted two-thirds of the organic matter from a good silty clay loam within 20 years.

Burning of organic matter—either by actual firing or by continuous growing of cultivated crops, which has the same effect—has ruined or seriously impoverished many millions of acres.

On the other hand, careful attention to maintenance of organic matter can keep a good soil good. Organic matter in the soil can be maintained by growing the legumes and grasses — in rotation with other crops on plow land; and by plowing under barnyard manure, crop residues, and green manure crops.

You have told this story before — many times. It will bear telling again—many times.

Reprints of this message are available on request.

JOHN DEERE

Moline, Illinois

Farmers Are Tying Down Their Topsoil with the Help of McCormick Farm Equipment

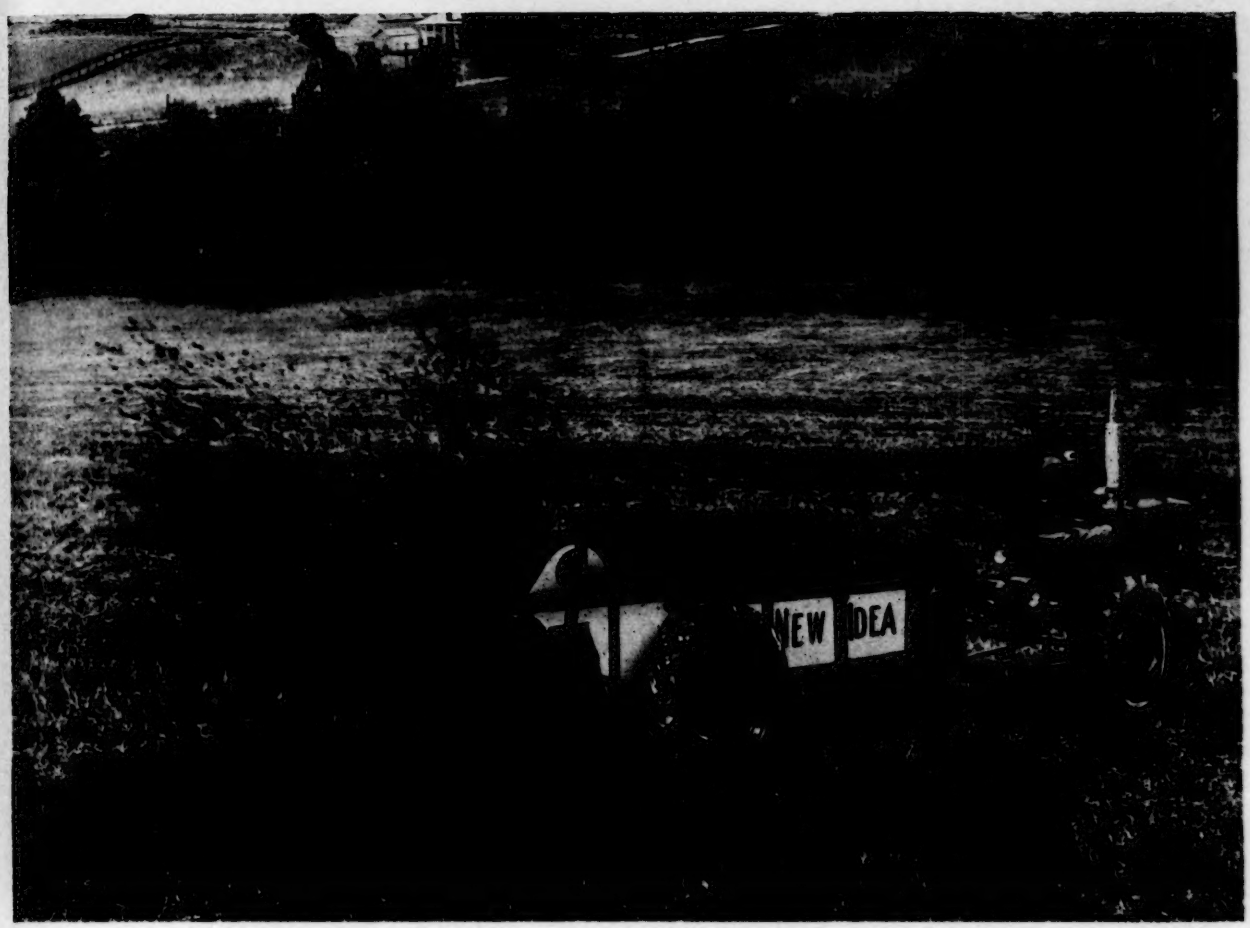
Thousands of farmers are using legume-loaded rotations, terraces, strip and contour farming to keep productive topsoil at home. They are discovering that McCormick Farmall tractors and McCormick farm equipment make these soil-saving practices both practical and *profitable* for them.

The Farmall operator has a "front-row" view of his work. He can follow winding contours like a hound dog on the scent. Fast, pin-point turns make it easy to farm terraced or strip-cropped land. The driver of a Farmall tractor has hydraulic fingertip control of drawn or mounted equipment. It's no trick to farm across grassed waterways without damaging the protective sod—without delaying the work.

The Farmall family of five different-sized tractors brings these and many other advantages to big, small, and in-between farms. A *full* line of matched McCormick equipment for these tractors makes it easy to farm the soil-saving way. Armed with this modern power machinery, most farmers can practice soil conservation and make it pay. International Harvester dealers all over America are showing them how!
International Harvester Company, Chicago 1

INTERNATIONAL HARVESTER

International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . .
Motor Trucks . . . Crawler Tractors and Power Units . . . Refrigerators and Freezers



Basic to Sound Soil-Building

CONSERVATIONISTS KNOW—conservationists stress —soil structure is as important to profitable agriculture as soil content.

For its plant foods alone, manure is worth many dollars per ton to America's farmers. But it has another value, perhaps even greater and longer lasting. That is the definite addition it makes to the humus and tilth of soil.

And it is because of this factor... its practical effectiveness for developing favorable aggregate structure... that Animal Agriculture is so highly recommended by leading exponents of sound soil-building practices all over the country.

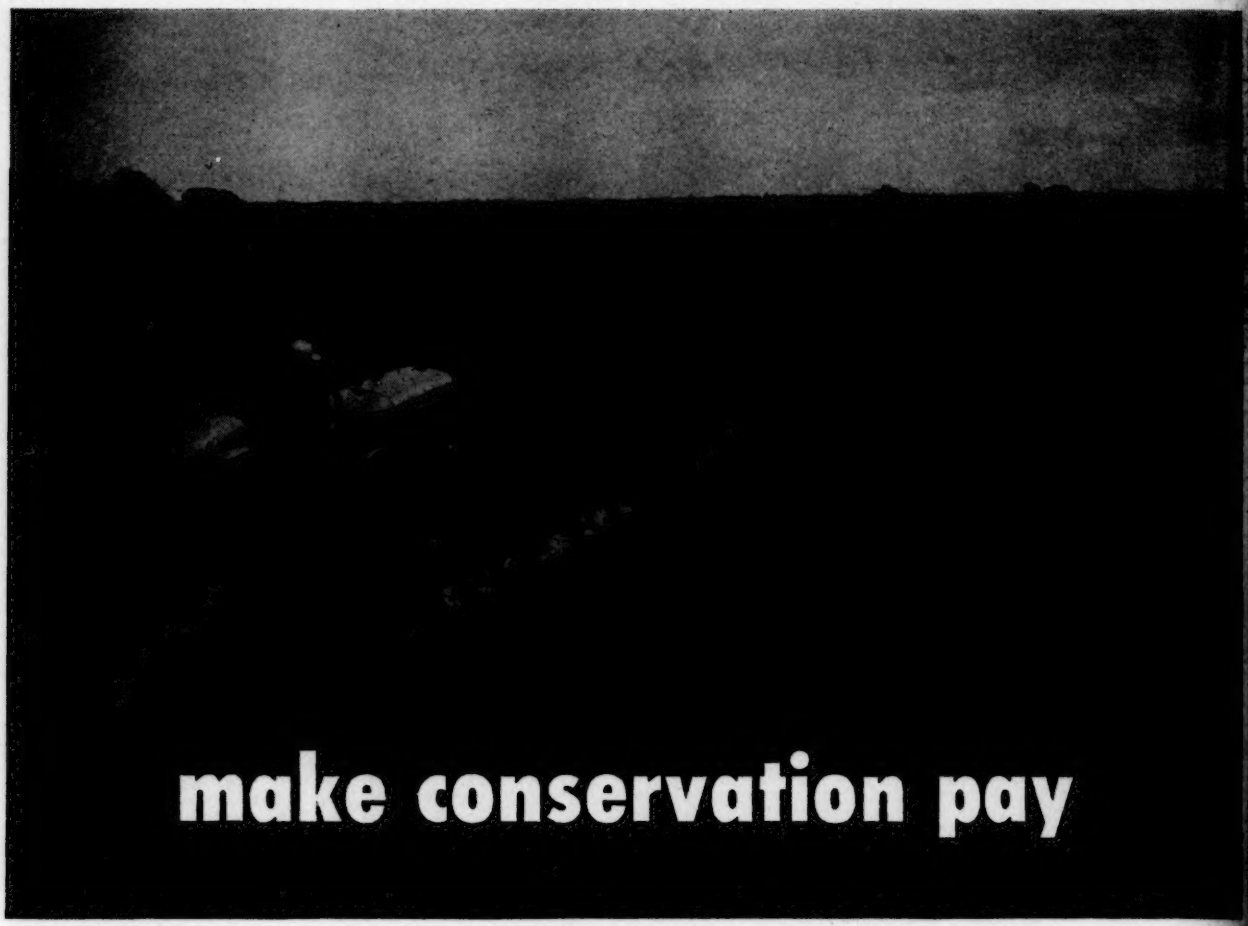
With many tons of material to be handled every year, obviously the choice of spreader is of prime importance. Its efficiency, durability and economy becomes increasingly a matter of dollars-and-cents concern to the farmer.

From the first, NEW IDEA Spreaders have been universally favored for the application of manure —for their thorough shredding, finer pulverization and wide, even distribution. Nationwide, the name NEW IDEA has become synonymous with soil improvement.

NEW IDEA
DIVISION AVCO MANUFACTURING CORPORATION
Coldwater, Ohio

that's why a **NEW IDEA** *is a* ***good*** *idea!*

Descriptive literature on NEW IDEA Spreaders—and on all other NEW IDEA Specialized Farm Machines—will be sent to you free on request. Write to Dept. 853.



make conservation pay

. . . IMMEDIATELY

MAKING Pay Dirt LAST

—a new 16-page booklet outlining practical conservation methods for all farms of all sizes. Available in single copies or quantity.

As a crop and soils man, you may know that it takes 9 to 15 acre-inches of water to grow a 50-bushel corn crop . . . 70 percent of this amount in July and August alone, when drouth is most likely. Where contouring will save two to three inches of water, it will put more corn in the crib . . . a direct and immediate benefit of soil conservation that the farmer understands.

But until the farmer knows how to operate modern equipment in line with new tillage practices, he will continue to follow the furrows of tradition up and down the hill.

Through its dealers, Allis-Chalmers has taken an active part in promoting the mechanics of soil conservation. The A-C dealer is always at your service. He knows from experience and factory instruction how power equipment can be used to make soil conservation easier, faster and lower in cost.

Allis-Chalmers dealers will cooperate in demonstrating soil conservation practices. Why not call on them for help?

ALLIS-CHALMERS
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